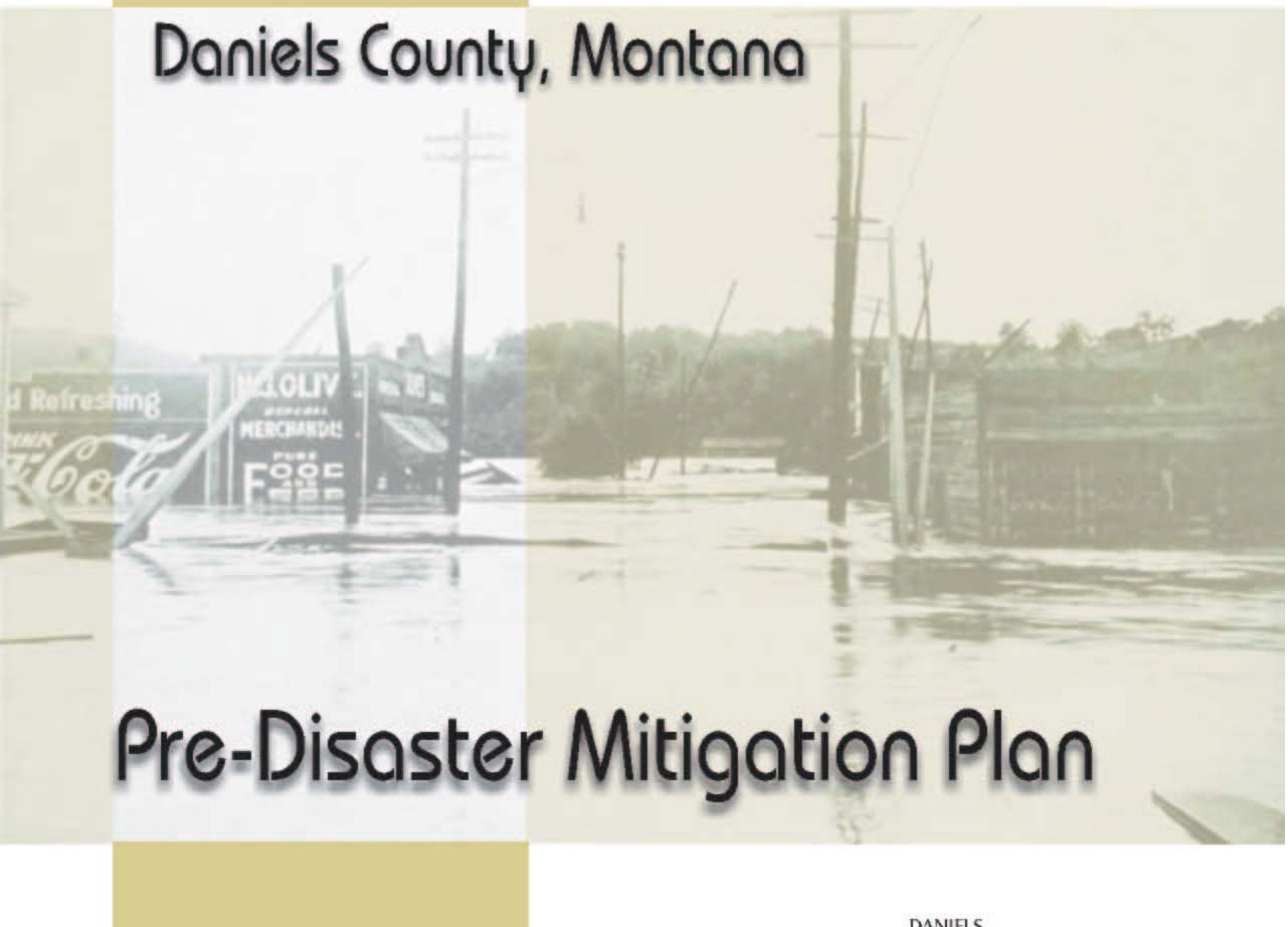
Daniels County, Montana



Pre-Disaster Mitigation Plan

September 2003

MAXIM TECHNOLOGIES INC. ENGINEERING & ENVIRONMENTAL CONSULTANTS

A TETRA TECH COMPANY

DANIELS COUNTY MONTANA
PRE-DISASTER MITIGATION PLAN

Prepared for:

Daniels County
P.O. Box 247
Scobey, Montana 59263

Prepared by:

Maxim Technologies, Inc.
P.O. Box 4699
Helena, Montana 59601
(406) 443-5210
fgifford@maximusa.com

September 2003

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF MAPS

TABLE OF CONTENTS (continued)

LIST OF APPENDICES

LIST OF ACRONYMNS

COE	U.S. Army Corps of Engineers
CRP	Conservation Reserve Program
DES	Montana Disaster and Emergency Services
DMA	Disaster Mitigation Act
DNRC	Montana Department of Natural Resources and Conservation
DOI	U.S. Department of Interior
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
GIS	Geographic Information Systems
HUD	U.S. Department of Housing and Urban Development
LEPC	Local Emergency Planning Committee
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resource Conservation Service
NWS	National Weather Service
PDM	Pre-Disaster Mitigation Plan
RFC	River Forecast Center
USFS	U. S. Forest Service
USGS	U. S. Geological Survey
WAPA	Western Area Power Administration

1.0 INTRODUCTION

The effects from natural and man-made hazards directly impact the safety and well being of Daniels County residents. Historically, county residents have dealt with floods, high winds, severe summer storms with damaging thunderstorms producing hail and tornadoes, harsh winter storms with extreme cold and blizzards, wildfires, drought, and hazardous material spills. While most hazards cannot be eliminated, the effects from them can be mitigated. Daniels County, working in conjunction with Montana DES and Maxim Technologies, Inc. (Maxim), prepared this Pre-Disaster Mitigation (PDM) Plan (the Plan) to help guide and focus hazard mitigation activities. The Daniels County Pre-Disaster Mitigation Plan profiles significant hazards to the community and identifies mitigation projects that can reduce their impacts. The purpose of the Plan is to promote sound public policy designed to protect citizens, critical facilities, infrastructure, private property, and the environment from natural and man-made hazards. The Daniels County Pre-Disaster Mitigation Plan includes resources and information to assist county residents, organizations, local government, and others interested in participating in planning for natural and man-made hazards. The mitigation plan provides a list of mitigation projects that will assist Daniels County in reducing risk and preventing loss from future hazard events.

1.1 AUTHORITY

The Disaster Mitigation Act (DMA) of 2000 amends the Robert T. Stafford Disaster relief and emergency assistance act by adding a new section, 322 – Mitigation Planning. It requires all local governments to have an approved Pre-Disaster Mitigation Plan in place by November 1, 2003 to be eligible to receive Hazard Mitigation Grant Program project funding.

Daniels County and the incorporated towns of Scobey and Flaxville have adopted this Pre-Disaster Mitigation Plan. These governing bodies have the authority to promote sound public policy regarding natural and man-made hazards. Copies of the signed Resolutions from these jurisdictions are included as ***Appendix A*** to this plan. The Plan was adopted at the regularly scheduled meetings of the Scobey and Flaxville city councils, and at a meeting of the Daniels County commissioners, all of which were open to the public and advertised through the communities' typical process for publicizing public meetings.

The Daniels County Disaster and Emergency Services (DES) Coordinator will be responsible for submitting the adopted Plan to the State Hazard Mitigation Office in Helena, Montana. The State Hazard Mitigation Officer will then submit the Plan to the Federal Emergency Management Agency (FEMA) for review. This review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA, Daniels County and the other plan signatories will gain eligibility for local mitigation project grants and post-disaster hazard mitigation grant projects (HMGP).

1.2 ACKNOWLEDGEMENTS

Many groups and individuals have contributed to development of the Daniels County Pre-Disaster Mitigation Plan. The local DES Coordinator, District DES Representative, and the Montana State Hazard Mitigation Officer provided significant guidance and support to all aspects of plan development. The National Weather Service provided historic newspaper accounts of severe weather events and other weather data. Numerous elected officials, city and county personnel, and the local communities participated in the planning process and contributed significantly to the Plan's development.

1.3 PROJECT AREA LOCATION

Daniels County is located in northeast Montana, and has a land area of about 923,520 acres or 1,443 square miles (USDA et al., 1985). Daniels County is bounded by Sheridan County on the east, Valley County on the west, Roosevelt County on the south, and Canada on the north. Scobey is the county seat and incorporated towns include Flaxville and Scobey. The Poplar River flows southward through Daniels County and into the Missouri River. ***Map1-1*** presents a location map of the Plan area. The Fort Peck Reservation occupies area within the southern portion of Daniels County. A separate Pre-Disaster Mitigation Plan has been developed for the Fort Peck Tribes.

Elevation in Daniels County ranges from about 2,200 feet above mean sea level (amsl) along the Poplar River, near the southern border of the county, to nearly 3,100 feet in the northwestern part of the county. Most of the County consists of upland glaciated plains. The plains are nearly level to steeply sloping. In places the landscape is dissected by steep drainages and rough ridges of weathered shale, siltstone, and sandstone.

According to the 2000 census, the population of Daniels County is 2,017. This represents a 11.0% decline in population in the 10 years since the last census. The median age in Daniels County is 47.0 years old (U.S. Bureau of the Census, 2001 in DO1, 2002).

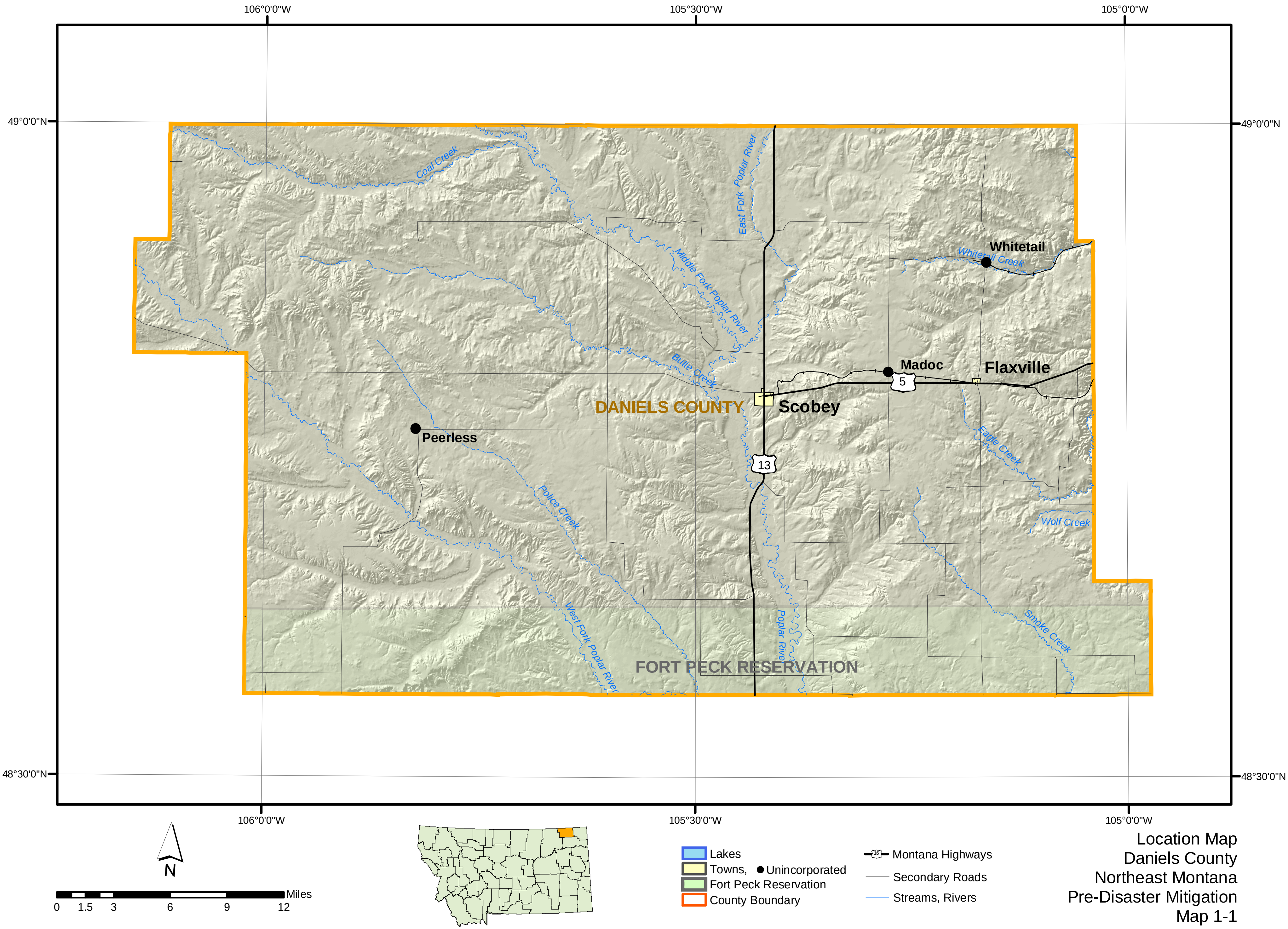
1.4 CLIMATE AND WEATHER

Daniels County, Montana is located within the region generally classified as dry continental or Steppe with four well-defined seasons. The weather can be quite changeable with large day to day temperature variations, particularly from the fall to the spring. Days with severe winter cold and summer heat are typical.

Average high temperatures in January are 15 to 22 F with average lows 5 below to 5 F above, with the coldest averages at lower valley locations. In winter in particular, temperatures often vary significantly from the averages. Temperatures around -50 F have been recorded, while typical extreme winter minimum temperatures are between -25 and -35 F. Often the coldest temperatures occur at sheltered valley locations when winds are light, but extreme wind chill situations occur almost every winter when windy conditions coincide with very low temperatures. Rapid warm-ups during the winter and early spring can lead to significant snow melt and flooding of small streams and rivers and/or ice jam flood problems.

Average high temperatures in July are in the 80s with average lows 55 to 60. Averages are fairly uniform across the county. Brief spells with temperatures above 100 F can occur but are often short lived. Temperatures above 105 F have been reported on rare occasion. Extended periods with temperatures above 90 F occur every few years. Freezing temperatures can occur, but are rare in June and August, particularly at sheltered valley locations.

Annual average precipitation is 12 to 13 inches, with over 70% of the precipitation falling from May through September. Precipitation can vary significantly from year to year, and location to location within a given year. November through March, are on average quite dry with average monthly precipitation of 0.50" or less. Average annual precipitation does not vary significantly across the county. The heaviest most intense precipitation often occurs with localized downpours associated with thunderstorms in June through August. Significant flash flooding can result from these downpours with over 3 inches of precipitation reported in a few events. Widespread heavy precipitation events of 1 to 2



Location Map
Daniels County
Northeast Montana
Pre-Disaster Mitigation
Map 1-1

inches can occur every few years and is most common from April through June and September through early November.

Average winter snowfall ranges from 25 to 38 inches, with the highest averages over the higher elevations over the northeastern part of the county. The heaviest snowstorms often occur from late March through May or mid October to mid November. These storms can produce more thaen 12 inches of snow and are often made more severe as temperatures are warmer, and therefore the snow is heavier and more difficult to travel in and remove. These storms are often accompanied by high winds resulting in blizzard conditions. In spring these storms can coincide with the calving season resulting in livestock loss. Mid winter snowstorms in general produce less then 6 inches of snow, but heavier amounts to 10 inches or more have occurred. Despite the generally lighter amounts and drier snow, high winds can result in blizzard conditions. Even without falling snow, in the colder conditions of mid winter, high winds can pick up loose snow, resulting in local ground blizzards.

Severe thunderstorms are common from June into early September. Typically the greatest hazards associated with these thunderstorms are very highs winds and large hail. Damage to structures and crops occur every summer from these storms. Tornadoes have been reported, but are relatively rare.

An important element of the climate in Daniels County is the often windy conditions. Average wind speeds range from 10 to 15 mph depending on the exposure of the location. The average and peak sustained winds tend to be stronger over higher more exposed terrain. The highest wind gusts often occur with thunderstorms during the summer, with gusts over 60 mph occurring every year. The highest sustained winds tend to occur in the spring and fall, with sustained winds over 40 mph occurring every year.

Table 1-1 details the top weather events recorded by the NWS at the Scobey weather station. Temperature, Precipitation, and Snowfall tables from Scobey are representative for the more exposed central and northern sections of the county. Night time winter temperatures are likely colder north of Scobey, and in sheltered valley locations.

TABLE 1-1 TOP WEATHER EVENTS RECORDED AT SCOBEY, MONTANA WEATHER STATION					
Hottest Days		**Coldest Days**		**Wettest Days**	
107°	8-7-1995	-48°	1/30/1996	2.9 inches	6/5/1976
106°	6-5-1988	-45°	2/8/1994	2.55 inches	7/4/1993
106°	7-19-1960	-43°	12/25/1996	2.23 inches	6/8/1950
106°	7-18-1951	-43°	2/3/1996	2.05 inches	8/21/1968
105°	8-7-1949	-43°	1/20/1954	1.99 inches	9/13/1954
Wettest Years		**Driest Years**		**Longest Dry Spells**	
21.90 inches	1951	6.98 inches	1971	76 days	10/1999
19.59 inches	1954	9.20 inches	1966	73 days	1/1975
16.77 inches	1950	9.21 inches	1990	58 days	9/1965
16.64 inches	1986	9.28 inches	1958	55 days	10/1949
16.54 inches	1995	9.33 inches	1961	55 days	3/1949
Note: Data from National Weather Service					

For the purposes of this hazard assessment and mitigation plan, weather is of interest when it threatens property or life and thus becomes a hazard. The NWS provides short-term forecasts of hazardous weather to the public. In addition to issuing tornado and severe thunderstorm watches the NWS also produces regularly-scheduled severe weather outlooks and updates on various forms of hazardous weather including heavy rain and winter storms. NWS's Warning and Advisory Criteria for severe weather is presented in ***Table 1-2***. Descriptions of historic weather related hazard events and documentation of the frequency, severity, and impact of hazardous weather is presented in ***Plan Section 3***.

TABLE 1-2
WARNING AND ADVISORY CRITERIA FOR SEVERE WEATHER

Summer Weather Event	**Criteria**	
Severe Thunderstorm Warning	Any thunderstorm wind gust equal to or greater than 58 mph; any hail size ¾ inch or larger.	
Tornado Warning	A violently, rotating column of air extending from the base of a thunderstorm to the ground.	
Flash Flood Warning	Flooding is imminent, water levels rise rapidly with inundation occurring in less than 6 hours.	
Flood Warning	Flooding is expected to occur more than 6 hours after the causative event.	
Winter Weather Event	**Winter Weather Advisory**	**Winter Storm/Blizzard Warning**
Snow	2-5 inches of snow in 12 hours	6 inches or more in 12 hours, or 8 inches in 24 hours
Blizzard	(see blowing snow)	Sustained winds or frequent gusts to 35 mph with visibility below a ¼ mile fro three hours or more
Blowing Snow	Visibility at or less than a ½ mile.	Visibility at or less than a ½ mile in combination with snowfall at or greater than 6 inches and/or freezing precipitation
Ice/Sleet	(see freezing rain/drizzle)	Accumulations of ¼ inch or more of ice.
Freezing Rain/Drizzle	Light precipitation and ice not forming on exposed surfaces.	None
Wind Chill	Wind chills of 20 to 39 below zero with a 10 mph wind in combination with precipitation.	Wind chills of 40 below zero or colder with a 10 mph wind in combination with precipitation.
Summer Weather Event	**Non-Precipitation Advisory**	**Non-Precipitation Warning**
High Wind	None	Sustained winds of 40 mph for an hour or any gust to 58 mph (non-convective winds).
Lake Wind	Sustained wind speeds of 25 mph or more for three or more hours.	None.
Heat	Heat index of 105 or more for at least three days.	High temperature of 105. Low of 80 or more for 3 days or more.

1.5 REGIONAL ECONOMY

The major source of income in Roosevelt and Valley counties is government, whereas the major industry in Sheridan and Daniels counties is agriculture. Average annual unemployment rates in 2000 in the four-county area ranged from a low of 3.0 percent in Daniels County to a high of 9.5 percent in Roosevelt County. Unemployment rates in Valley and Sheridan counties were 4.1 percent and 4.4 percent, respectively (Montana Department of Labor and Industry, 2001 in DOI, 2002).

The estimated percent of people of all ages in poverty in the state was 15.7 percent in 1998. Roosevelt County had the highest percent of people in poverty of the four-county area with 31.7 percent, followed by Valley County (18.7 percent), Daniels County (15.6 percent), and Sheridan County (13.7 percent) (U.S. Bureau of the Census, 2001b in DOI 2002).

1.6 SCOPE AND PLAN ORGANIZATION

The scope of the Daniels County Pre-Disaster Mitigation Plan includes the following:

- Identify and prioritize disaster events that are most probable and destructive,
- Identify critical facilities,
- Identify areas within the community that are most vulnerable,
- Develop goals for reducing the effects of a disaster event,
- Develop specific projects to be implemented for each goal,
- Develop procedures for monitoring progress and updating the Plan, and
- Officially adopt the Plan.

The Plan is organized into sections that describe the planning process (Section 2), risk assessment (Section 3), mitigation strategies (Section 4), and plan maintenance (Section 5). Appendices containing supporting information are included at the end of the Plan.

2.0 PLANNING PROCESS

The Daniels County Pre-Disaster Mitigation (PDM) Plan is the result of a collaborative effort between Daniels County citizens, public agencies, local utility companies, and regional, state, and federal organizations. Public participation played a key role in development of goals and mitigation projects. Interviews were conducted with the Daniels County DES Coordinator, mayors, and elected officials, and a public meeting was held to include the input of Daniels County residents.

2.1 CONTACT LIST

The PDM planning process was initiated by preparing a contact list of individuals whose input was needed to help develop the Plan. On the County level, these persons included elected officials (County Commissioners), the DES Coordinator, and County Road Superintendent. Councilpersons from the incorporated towns were listed (Flaxville and Scobey), as well as the mayors, fire chiefs and public works directors. Federal and State agencies on the contact list included the National Weather Service, Army Corps of Engineers, Western Area Power, and Montana Department of Natural Resources and Conservation. Private utilities included Nemont Telephone, and Sagebrush Cellular. ***Appendix B*** presents the Daniels County contact list. Persons and entities on the contact list received a variety of information during the planning process, including project maps and documents for review, meeting notifications, and mitigation strategy documents.

2.2 STAKEHOLDER INTERVIEWS AND MEETINGS

Interviews were conducted with individuals and specialists from organizations interested in hazard mitigation planning. The interviews identified common concerns related to natural and man-made hazards and identified key long- and short-term activities to reduce risk. Stakeholders interviewed for the plan included representatives from local government, water providers, fire departments, and utility providers. A list of meetings and interviews with Daniels County stakeholders is presented in ***Appendix B***.

2.3 FORMAL PUBLIC MEETINGS

One public meeting was conducted in Daniels County during initial plan development. The meeting was held in Scobey on March 12, 2003. The purpose of the meeting was to gather information on historic disasters, update the list of critical facilities, and gather ideas from citizens about mitigation planning and priorities for mitigation goals. The sign-in sheet from the Daniels County public meeting and meeting summary is presented in ***Appendix B***.

In advance of the public meeting, a press release was distributed to local and regional newspapers including the Daniels County Leader, Great Falls Tribune, and Billings Gazette. Local radio stations who received copies of the press release as public service announcements included KCGM Scobey and Northern Ag Radio. Notices of the public meeting were sent in advance to all jurisdictions participating in the planning process including Scobey, Flaxville, and Daniels County. Notices were sent to all federal, state, and local officials on the project contact list (***Appendix B***). A copy of the press release and media distribution list is included in ***Appendix B***. ***Appendix B*** also contains copies of the press release as it appeared in several local newspapers. Reporters were in attendance at several of the public meetings and follow-up articles on Plan development appeared in local newspapers.

The City Council and County Commission meetings at which the resolutions adopting the plan were passed provided the public with the opportunity to review the final version of the plan.

2.4 OTHER PROJECT MEETINGS

Over the course of the project numerous meetings were held with, and briefings given to, local officials and other stakeholders. At the project's inception the Montana DES District Representative, and the Project Manager for Maxim Technologies Inc., toured the project area and met with commissioners from each county, mayors for most of the incorporated towns, Tribal staff, Bureau of Indian Affairs staff, representatives from local utilities, Local Emergency Planning Committee (LEPC) members, National Weather Service (NWS) staff, US Corps of Engineers (COE) staff, county health officials, and others. The overall project objectives were presented at these meetings and initial concerns and potential mitigation projects were discussed.

2.5 PLAN REVIEW

Review copies of the draft Plan were provided to the DES Coordinator for distribution in hard copy. Plan reviewers included county commissioners, mayors of the various jurisdictions, representatives of the local utility companies, the National Weather Service, and other federal, state, and local officials. The DES Coordinator provided review copies of the Plan to all jurisdictions involved in the planning process including Scobey, Flaxville, and Daniels County. Public comments were submitted to the DES Coordinator after a 30-day review period. The DES Coordinator reviewed the comments and submitted a consolidated list of them to Maxim.

A review of the Plan for completeness was conducted after the initial comments were addressed. Plan copies were submitted to the Montana DES Hazard Mitigation Officer and the Montana FEMA representative for review. The review period lasted 30-days. Upon receipt of comments, the Plan was finalized and taken to the County commissioners and jurisdictions for adoption.

Future comments on this Plan should be addressed to:

Daniels County Disaster and Emergency Services Coordinator
P.O. Box 247
Scobey, MT 59263
(406) 783-5510

3.0 HAZARD EVALUATION AND RISK ASSESSMENT

A risk assessment was conducted to address requirements of the Disaster and Mitigation Act of 2000 (DMA 2000) for evaluating the risk to the community of the highest priority hazards. DMA 2000 requires measuring potential losses to critical facilities and property resulting from natural hazards by assessing the vulnerability of buildings and critical infrastructure to natural hazards. In addition to the requirements of DMA 2000, the risk assessment approach taken in this study will evaluate risks to vulnerable populations and also examine the risk presented by man-made hazards. The goal of the risk assessment process is to determine which hazards present the greatest risk and what areas are cumulatively the most vulnerable to hazards.

The hazard risk assessment requires information about what hazards have historically impacted the community and what hazards may present risks in the future. Identifying historical and possible future hazards was primarily accomplished in two phases. The first phase entailed interviewing local government officials and staff, local emergency planning and response staff, and the general public. ***Plan Section 2*** describes the interview/public input process in detail. The second phase entailed researching government records and news publications for records of previous hazard events. The results of the initial hazard evaluation were used to focus further risk assessment on hazards that historically had caused the most problems and those judged to be of most future concern.

The risk assessment approach used for the Daniels County Pre-Disaster Mitigation Plan entailed using Geographic Information System (GIS) software and data to develop vulnerability models for people, structures, and critical facilities and evaluating those vulnerabilities in relation to hazard profiles that model where hazards exist. This type of approach to risk assessment is very dependent on the detail and accuracy of the data used during the analysis. Additionally, some types of hazards are extremely difficult to model. The schedule and resources available for conducting this risk assessment dictated that existing data be used to perform the assessment. The existing information available is extensive but also has many limitations. Results of risk assessment allow hazards to be compared and relative comparisons to be made of areas within the jurisdiction.

3.1 HISTORICAL HAZARDS

Daniels County may be affected by many types of natural, technological, and human caused hazards. Examples of natural hazards that have impacted the region include earthquakes, flooding, wildfire, severe winter storms, tornadoes, and drought, among others. Technological hazards are caused by human processes. Technological hazards that exist in the region include explosions, urban fires, uncontrolled chemical or hazardous material release (either at a fixed location or in transit), power outage, and dam failure, among others. Human-caused hazards are the result of direct (purposeful) actions of humans. Possible human-caused hazards include civil unrest/riots, and terrorism.

Available documentation of historic hazards is directly related to their occurrence near populated areas. An exhaustive search was conducted for hazard data on Daniels County but due to the rural nature of the county, very little information exists. Te lack of data does not mean there is a lack of hazards or risk from hazards in Daniels County. To illustrate this point, regional hazard information is used in the Daniels County PDM Plan to supplement the data specific to the county that was found.

The hazards most likely to affect Daniels County were derived from a number of sources. Hazard information was compiled by examining data from DES, FEMA, the U.S. Coast Guard, and the NWS, reviewing historical newspaper articles, and interviewing local experts. Most importantly, the residents of Daniels County voiced their opinions on what hazards had affected their lives and their communities during the public meetings. ***Table 3-1*** lists the State and Federal declared disasters that have occurred in Daniels County. The dates listed in the table refer to when the disaster declaration was signed by the governor and/or president, and not the date the hazard event occurred.

TABLE 3-1
DECLARED DISASTERS IN DANIELS COUNTY

Date of Declaration	Event	Area Affected	State Disaster Declaration	Federal Disaster Declaration
November 14, 2000	Winter Storm	County-wide	Yes	Yes
July 26, 1999	Wildland Fires	County-wide	Yes	Yes
April 27, 1999	Flooding	County-wide	Yes	No
September 9, 1994	Wildland Fires	County-wide	Yes	No
June, 1986	Grasshopper Infestation	County-wide	Yes	No
March, 1986	Flooding	County-wide	Yes	Yes

3.1.1 Floods

A flood is a natural event for rivers and streams. Excess water from snowmelt and rainfall accumulates and overflows onto the banks and adjacent floodplains. Floodplains are lowlands, adjacent to rivers and lakes that are subject to recurring floods. A flash flood generally results from a torrential (short duration) rain or cloudburst on a relatively small drainage area. Chinook winds, warm dry winds that can gust to 100 mph and that are typical to the area, often lead to the rapid melting of snow and cause flooding.

Hundreds of floods occur each year, making it one of the most common hazards in all 50 states. Floods kill an average of 150 people a year nationwide. Most injuries and deaths occur when people are swept away by flood currents and most property damage results from inundation by sediment-laden water. Faster moving floodwater can wash buildings off their foundations and sweep vehicles downstream. Pipelines, bridges, and other infrastructure can be damaged when high water combines with flood debris. Basement flooding can cause extensive damage.

3.1.1.1 Location and Extent of Previous Flood Events

The Poplar River, with its east, middle, and west forks, is the dominant stream draining Daniels County. Butte Creek drains the west-central part of the county and is a major tributary to the main stem of the Poplar River. Eagle Creek, Whitetail Creek, and Smoke Creek drain the eastern quarter of the county and feed into Big Muddy Creek, which flows through Sheridan and Roosevelt Counties. Many of these drainages are subject to flooding. Most of Daniels County has not entered into the FEMA flood protection program and flood plain maps have not been developed for many of the flood prone areas. Local residents indicated that flooding was not a big problem in Daniels County.

Table 3-2 presents the flood listings from the NWS Storm Events Database (***Appendix F***). Storm type definitions are presented in ***Table 1-2***.

Daniels County received two disaster declarations for flooding; one during March 1986, and the other April 27, 1999. A description of two historic flooding events in Daniels County is presented below.

April 1916 – The Poplar River reached the highest level in 20 years. At points near Scobey it was 1¼ miles wide and impossible to cross at any point except by boat. Considerable damage was done to the bridges. (*High Water at Scobey*, Glasgow Courier, April 21, 1916.)

May 1999 – Fast moving water and ice took out a 60 foot wooden low water bridge about 15 miles south of Scobey on the Susag road east of Highway 13. French Lane, north of Scobey, also flooded as temperatures above freezing melted winter's snow away. (Photograph captions, March 18 & 25, Daniels County Leader.)

TABLE 3-2
NWS STORM EVENTS DATABASE
FLOOD LISTINGS IN DANIELS COUNTY

Location	Date	Type	Comments
Daniels County	3/26/1997	Flood	
Peerless	7/4/1998	Flash Flood	
Richland	7/4/1998	Flash Flood	
Scobey	7/5/1998	Flash Flood	
Daniels County	3/17/1999	Flood	$85,000 property damage
Scobey	4/9/1999	Flash Flood	
Peerless	5/29/1999	Urban/small stream flood	

3.1.2 Winter Storms

Winter storms and blizzards follow a seasonal pattern that begins in late fall and lasts until early spring. These storms have the potential to destroy property and~~,~~ kill livestock and people. Winter storms may be categorized as sleet, ice storms or freezing rain, heavy snowfall or blizzards. Blizzards are characterized by low visibility caused by high winds and blowing snow.

A severe winter storm is generally a prolonged event involving snow or ice and extreme cold. The characteristics of severe winter storms are determined by the amount and extent of snow or ice, air temperature, wind speed, and event duration. Severe winter storms create conditions that disrupt essential regional systems such as public utilities, telecommunications, and transportation routes. Ice storms accompanied by high winds can have destructive impacts, especially to trees, power lines, and utility services.

Winter storms are frequently the precursors to spring flooding; the more snow, the better the chances of floods if a quick warm-up occurs. Any snowfall over 4 inches is likely to have an effect on both property and lives in Daniels County as snow frequently combines with winds in northeast Montana to produce blizzards. The NWS reports that at least three lives have been lost due to extreme cold in northeast Montana.

3.1.2.1 Location and Extent of Previous Winter Storm Events

Numerous severe winter storm events have affected northeastern Montana and impacted Daniels County residents. ***Table 3-3*** presents the winter weather listings from the NWS Storm Events Database (***Appendix F***). Storm type definitions are presented in ***Table 1-2***.

TABLE 3-3
NWS STORM EVENTS DATABASE
WINTER WEATHER LISTINGS IN DANIELS COUNTY

Date	Type	Comments
11/18/1996	Heavy Snow	
12/16/1996	Blizzard	
1/8/1997	Extreme Windchill	One death
3/12/1997	Blizzard	
2/25/1998	Blizzard	One death
3/23/1998	Heavy Snow	
12/4/1998	Heavy Snow	
5/11/1999	Heavy Snow	
12/15/2000	Blizzard	
3/5/2002	Heavy Snow	

A brief synopsis of major winter storms, as chronicled by local newspapers, is presented below.

February 1923 – Temperatures dropped from 32 below to 47 below in northeast Montana during the worst blizzard in years. (*Terrible Blizzard Rages for 2 Days*, Valley County News, February 16, 1923.)

February 1933 – North wind brought snow, which made travel impossible. Temperatures dropped to 44 below zero. Power outages occurred when wind snapped utility poles. (*Mercury Goes to 40 Below; Strong Gale Adds to Discomfort*, Glasgow Courier, February 10, 1933.)

February 1947 – A winter storm struck with intensity and speed that caught many unprepared. The accompanying 32 mph wind and zero visibility on the highway stranded many motorists. (*Short, Swift Blizzard Strikes; Entire County Locked in Storm*, Glasgow Courier, February 5, 1947.)

March 1951 – The winter storm of 1951 stands as one of the most severe. Wind gusts of 55 and 60 mph caused zero visibility due to blowing snow. Motorists were stranded due to blinding conditions that caused them to drive off highways into ditches. (*Big Storm Finds Many Marooned*, Glasgow Courier, March 22, 1951.)

February 1952 – A severe storm blocked roads and caused electric power interruptions due to high wind and heavy snowfall. The storm claimed the lives of three persons in Opheim who were found frozen in deep drifted snow. (*Three Dead Near Opheim, After Week End Snow Storm; Storm Causes Power and Road Trouble*, Glasgow Courier, February 21 and 22, 1952.)

February 1978 - Wind whipped snowdrifts more than nine feet high, isolated farm and ranch families and blocked most roads. No lives were in danger but the livestock industry approached a state of emergency. There was zero visibility throughout the County with wind up to 45 mph. The wind chill factor was 36 below. (*Storm Grips Area*, Glasgow Courier, February 9, 1978.)

November 2000 – Daniels County was hard hit by a severe winter storm that occurred during November 2000 and received a federal disaster declaration. A summary of the letter sent to President Clinton by Governor Racicot is presented below:

"On October 31, 2000 a rainstorm hit northeast Montana. The storm started as a drizzle, however, by the early morning hours of November 1, 2000 it had turned into snow and sleet. The storm produced wind gusts of 30 to 40 mph, temperatures reaching 35 degrees below zero and snow drifts up to 3 and 4 feet deep. The initial storm was followed by additional and intermittent storms across eastern Montana. These combined storms represent the earliest and heaviest snows ever-recorded in portions of northeastern Montana."

"A winter weather event of this magnitude has a substantial impact on the commercial, municipal, residential, and agricultural arenas. The biggest impact commercially was on the electrical co-ops, which serve the rural areas. Freezing temperatures followed the rainstorm, causing ice to accumulate on power lines. The weight of the ice was so tremendous that it snapped power lines and broke poles. Overall, electrical co-ops lost upwards of 895 power poles, which affected over 6,500 customers. The power outages ranged between 12 hours up to 3 weeks in some areas."

"Vital water pumps were among the losses caused by the power outages. Therefore, municipalities suffered the loss of fire suppression along with a depletion of town emergency water supplies, causing local government to restrict citizens to an 'Emergency Only' water ration. State snowplows had to work 20 hours a day for snow removal in 'Emergency Only' travel conditions."

"Residents lost electricity, which negated their personal wells and threatened their major heat source. The amount of snow and ice was so immense that the weight collapsed roofs causing major structural damage."

3.1.3 Wildfire

A wildfire is an unplanned fire, a term which includes grass fires, forest fires and scrub fires be it man caused or natural in origin. Severe wildfire conditions have historically represented a threat of potential destruction within Montana. Negative impacts of wildfire include loss of life, property and resource damage or destruction, severe emotional crisis, widespread economic impact, disrupted and fiscally impacted government services, and environmental degradation.

Wildland/urban interface is defined as the zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuel. In northeast Montana, the wildland/urban interface typically is where the edge of local communities adjoin agricultural fields, many of which are in CRP.

U.S. Forest Service (USFS) data for 1990 indicate that 25.7 percent of reported wildfires were caused by arson. Other ignition sources were debris burns (24 percent); lightning (13.3 percent); and other (16.7 percent). Lightning can present particularly difficult problems when dry thunderstorms move across an area suffering from seasonal drought. In northeast Montana, the railroad is a relatively common ignition source of wildfires.

Multiple fires can be started simultaneously, as is often the case in northeast Montana. In dry fuel areas, these fires can cause massive damage before containment. Dry grass, associated with farmland in CRP, is the primary fuel for northeast Montana wildfires. The rate of spread of a fire varies directly with wind speed. Numerous wildfires have impacted residents in northeast Montana. The generally windy conditions typical to the region as noted in ***Plan Section 1.4*** cause wildfires to spread rapidly as happened with the Outlook fire of 1999 described below. Wooden structures preserved for historic purposes, such as those at Pioneer Town outside Scobey, are particularly at risk from wildfire.

3.1.3.1 Location and Extent of Previous Wildfire Events

Wildfires in 1994 and 1999 were declared State and/or Federal disasters. A description of some wildland fires that have occurred in northeast Montana is presented below.

Oswego Fire - September 11, 1971 – A raging prairie fire consumed 15,000 acres and burned the town of Oswego, in Valley County. Thirteen occupied homes were completely destroyed, along with several other vacant buildings, one of the town's two grain elevators, and a highway bridge. The local utility company suffered losses when many of their poles burned and downed electrical wire. The grass fire burned over 2.8 miles of railroad ties on Burlington Northern's tracks. The source of the fire started at the town's garbage dump where near hurricane force winds blew sparks into a haystack. The fire in Oswego was not the first that town had suffered. Twice in its history prairie fires decimated the town of Oswego, the last large one was about 1922. At the same time as the Oswego fire, a grass fire in the Wolf Creek area burned thousands of acres. The fire was set by dry lightning. (*Flames Gut Oswego; Aid Coming*, The Herald News, September 16, 1971.)

Bainville Fire - June 1988 – A range fire south and east of Bainville, in Roosevelt County, started along the Burlington Northern railroad tracks, destroyed two homes, a County bridge and burned an area 2½ miles wide and eight miles long. (*Range Fire Destroys Farms*, Wolf Point Herald, June 16, 1988.)

The Pines Fire - August 1, 1998 – A fire pushed by 40 mph wind threatened cabins in the Pines recreation area on Fort peck Reservoir, in southwestern Valley County. The fire was human-caused and began near the Pines Youth Camp facility. It burned approximately 1,250 acres in a heavily timbered area *(Weekend Blaze in the Pines Recreation Area,* Wolf Point Herald News, August 6, 1998.)

Murray Fire – August 6, 1999 – Firemen from Reserve, Medicine Lake and Plentywood battled a 100-acre wheat field fire about six miles northwest of Reserve, in Sheridan County. Combining was in progress and equipment malfunction caused heat or sparks that ignited the field of ripe grain. (*Fire Consumes 100 Acres; Burning Ban is Approved*, Sheridan County News, September 1, 1999.)

Culbertson Fire – October 24, 1999 – North of Culbertson, a pickup truck started a grass fire that was then spread by 20 mph winds. Approximately, 720 acres were charred in a 4-mile long by 1½-mile wide area. (*October 24 Prairie Fire Burns 720 Acres North of Culbertson,* Culbertson Searchlight, October 28, 1999.)

Outlook Fire - October 31, 1999 – A massive, wind-fueled wildfire swept across the prairie and about 20 buildings, including 3 inhabited homes, the post office, and gas station, and three grain elevators burned to the ground. At times, the blaze spread as fast as 40 mph. When the fire was finally contained it had burned a swath a mile wide and 15 miles long. The fire began about eight miles west of Outlook along the Soo Line railroad tracks, in Sheridan County. Officials said sparks from a passing locomotive set fire to the grassy right-of-way and wind gusts up to 60 mph blew it out of control. Damage to the railroad was $750,000, including a destroyed locomotive, damaged railcars, charred railroad ties, and two obliterated wooden rail bridges. (*Families Return to Burned Homes*, Great Falls Tribune November 2, 1999.) Farmers and ranchers lost livestock, forage, fences, equipment and other real property. The NWS reported 18,000 acres burned and $4 million in damages. (*Halloween 1999 Firestorms*, NWS Power Point Presentation.)

Wolf Point Fire - October 31, 1999 – A grass fire started three miles east of Wolf Point and burned east toward Poplar, cutting a four-mile wide swath. It jumped the Missouri River and into McCone County. Firefighters were battling wind ranging from 40 to 60 mph. Rural structures were burned including six homes southeast of Wolf Point and the local UPS building where a two-building complex and six trucks were destroyed. Damage was estimated between $4 and $5 million. (*Wolf Point Families Homeless*, Great Falls Tribune, November 2, 1999.) The NWS reported that 8,000 acres burned (*Halloween 1999 Firestorms*, NWS Power Point Presentation.)

Antelope Fire - October 31, 1999 – The ferocious wind that spread the Outlook fire also sent a power line to the ground southwest of Antelope, in Sheridan County. The blaze grew in rough coulees and spread rapidly in high wind. Firemen battled to save structures in the Antelope area but one occupied residence was lost. The fire burned an area 7-miles by 2-miles wide. *(Fires Ravage County*, Sheridan County News, November 3, 1999.)

3.1.4 Severe Thunderstorms

The NWS estimates that over 100,000 thunderstorms occur each year in the U.S. Approximately 10 percent are classified as severe. Thunderstorms can produce deadly and damaging tornadoes, hailstorms, intense downburst and microburst wind, lightning, and flash floods. Thunderstorms spawn as many as 1,000 tornadoes each year. Since 1975, severe thunderstorms were involved in 327 Federal disaster declarations.

Hailstorms develop from severe thunderstorms. Hailstorms occur frequently during the summer months in northeast Montana. NWS data indicates that about 40 hail events affected Daniels County between 1955 and 2001. Nationally hailstorms cause nearly $1 billion in property and crop damage annually, as peak activity coincides with peak agricultural seasons. Severe hailstorms also cause considerable damage to buildings and automobiles, but rarely result in loss of life. The largest hailstones reported in Daniels County were 4 inches in diameter and fell on July 4, 1998 in the Richland area (NWS data).

A windstorm is generally a short duration event involving straight-line wind and/or gusts in excess of 50 mph. Windstorms affect areas with significant tree stands, as well as areas with exposed property, major infrastructure, and aboveground utility lines.

Tornados are the most concentrated and violent storms produced by the earth's atmosphere. They are created by a vortex of rotating wind and strong vertical motion, which possess remarkable strength and can cause widespread damage. The most violent tornadoes are capable of tremendous destruction with wind speeds of 250 mph or more. Tornadoes are most common in the Midwest, and are more infrequent and generally small west of the Rockies.

Northeast Montana has experienced tornadoes, many of which have produced significant damage and occasionally injury or death. Over the 52 year period of record from the NWS 11 tornadoes have been confirmed in Daniels County.

3.1.4.1 Location and Extent of Previous Severe Thunderstorm Events

Numerous severe thunderstorm events have affected northeastern Montana and impacted Daniels County residents. ***Table 3-4*** presents the severe summer storm listings from the NWS Storm Events Database (***Appendix F***). Storm type definitions are presented in ***Table 1-2***.

TABLE 3-4
NWS STORM EVENTS DATABASE
SEVERE SUMMER WEATHER LISTINGS IN DANIELS COUNTY

Location	Date	Type	Comments
Daniels County	7/19/1956	Hail	1.25-inch diameter hail
Daniels County	6/20/1959	Tornado	$3,000 property damage
Daniels County	8/5/1965	Tornado	
Daniels County	6/11/1972	Tornado	$3,000 property damage
Daniels County	6/8/1988	4 Tornadoes	
Daniels County	8/17/1988	Thunderstorm wind	75 kts.
Daniels County	8/18/1989	Thunderstorm wind	63 kts.
Daniels County	6/29/1991	Tornado	
Near Flaxville	6/23/1994	Thunderstorm wind	$50K property damage
Flaxville	8/7/1995	Thunderstorm wind	
Scobey	8/24/1995	Thunderstorm wind	
Peerless	6/11/1996	Hail	0.75-inch diameter hail
Peerless, Whitetail	6/17/1996	3 Thunderstorm wind reports	57 to 60 kts.
Four Buttes, Peerless, Madoc	8/2-8/1997	5 Thunderstorm wind reports	52 to 60 kts.; $50K crop damage Peerless; $20K property & $75K crop damage Four Buttes
Flaxville, Scobey	8/27-29/1997	2 Thunderstorm wind & 2 Hail reports	$25K property damage Scobey; 0.75- & 1.75-inch diameter hail
Peerless	6/23/1998	Hail	0.75-inch diameter hail
Peerless, Richland, Scobey	7/4-8/1998	15 Hail reports	0.75- to 4-inch diameter hail
Scobey, Whitetail, Flaxville	8/1-10/1998	4 thunderstorm wind reports	$6K property damage Scobey; $6K crop damage Whitetail
Whitetail	5/21/1999	Hail	0.75-inch diameter hail

TABLE 3-4
NWS STORM EVENTS DATABASE
SEVERE SUMMER WEATHER LISTINGS IN DANIELS COUNTY

Location	Date	Type	Comments
Madoc, Peerless, Richland, Flaxville, Whitetail	6/19-25/1999	3 Hail & 3 Thunderstorm wind reports	0.75-inch diameter hail; $1K property damage Whitetail; Winds 56 to 63 kts.
Richland, Peerless	7/12-13/1999	5 Hail & 1 Funnel cloud report	0.88- to 1.75-inch diameter hail
Scobey	5/10/2000	2 Hail reports	0.75-inch diameter hail
Whitetail, Flaxville, Peerless, Four Buttes	8/2-11/2000	5 Hail reports	0.75- to 3-inch diameter hail
Scobey	9/4/2000	Hail	0.75-inch diameter hail
Peerless, Scobey	7/20/2001	Hail & Tornado	0.75-inch diameter hail

A brief synopsis of severe thunderstorm events in northeast Montana, as chronicled by local newspapers, is presented below.

July 1923 – A violent storm killed a young man when he was struck by lightning near Glentana. The storm assumed the nature of a tornado and proceeded to damage crops as well as buildings. The Sheriff reported that 128 houses, barns and granaries were wrecked by the storm. (*Bad Storm Does Much Damage*, Valley County News, July 27, 1923.)

May 1933 – Heavy rain and a severe hail struck the area from Richland to Peerless. Hail, the size of large plums, fell thick and fast for more than an hour forming drifts up to four feet thick. (*Big Hail Storm Hits Community Near Richland*, Glasgow Courier, May 26, 1933.)

July 9, 1946 – The communities of Scobey, Flaxville, and Whitetail witnessed 6.09 inches of rainfall in six hours. Damage was extensive all over town; the roof on the Gorham Hotel in Scobey was unable to withstand the deluge and collapsed into the building. All over town basements took on water in varying degrees. The communities became isolated as roads washed out, which was complicated when power, light, and telephones went out. Five washouts occurred on the highway between Scobey and Wolf Point, and a serious washout occurred between Flaxville and Whitetail. Rail service was interrupted along the branch line for many days. Hailstorms seriously damaged crops in the Silver Star and Four Buttes communities. Rain washed out miles of fences. A twister took out a grandstand, granaries and some houses. The greatest single disaster occurred when the Carrol dam west of Plentywood washed out. The wall of water released moved down the valley destroying homes and farm buildings. (*6-Inch Rain in 6 Hours*, Daniels County Leader, July 11, 1946.)

August 1953 – A violent storm struck an area a six or seven square mile area southwest of Glasgow causing severe hail and wind damage. The tornado-strength wind caused crop damage and damage to several structures. A metal granary was blown over and a frame granary was torn off its foundation landing in a field about 50 yards away. A garage made of railroad ties was completely destroyed. (*Storm Causes Hail, Tornado Damage*, Glasgow Courier, August 13, 1953.)

August 1962 – A violent tornado struck the Opheim area, wrecking buildings, uprooting trees and tearing down power and telephone lines in several areas. The roof and siding were blown off a lumberyard and a steel granary blew into a home, breaking windows. A hangar and plane at the Opheim airport was damaged when the door blew off and the tail of plane jammed through the hangar roof. Telephone service was out for about 12 hours and some power transmission lines were out for several days. (Glasgow Courier, *Tornado, Hailstorm Strikes in North County*, August 7, 1962.)

July 1983 – A tornado touched down in the Vandalia area, 15 miles west of Glasgow. The storm broke off 72 power poles. A large irrigation sprinkler system and three large grain bins were damaged at a local farm. Roofs and windows were damaged at several residences. (*Tornado with Hail Rips Through Vandalia Area*, Glasgow Courier, July 14, 1983.)

August 8, 1997 – A vicious thunderstorm left 15,000 acres of crops ruined. Golf-ball sized hail was reported east of Richland. The hail trail was a swath about 2 to 3 miles wide and about eight miles long extending from the Peerless area to west of Four Buttes. A trailer house in Four Buttes was flipped over on its top and destroyed. In Scobey, the tin roof was ripped off of a local tavern. (*Crops Flattened as Storm Rips Thru County*, Daniels County Leader, August 14, 1997.)

August 27, 1997 – Strong thunderstorms made their way across the prairie of northeast Montana. The Port of Raymond and town of Flaxville both reported winds of 65 mph. Hail accumulated to depths of one foot in the town of Westby. Two inches of rain fell in Froid and water from the cloud burst flooded Main Street. A 93 mph gust southwest of Lustre hit southern Daniels County causing extensive property damage. A large hip-roof barn and new cattle shed were blown into shambles at a farm 20 miles southeast of Scobey. Three inches of rain were reported in southern Daniels County. *(Severe T-Storms Pound County, Other Regions,* Daniels County Leader, September 4, 1997.*)*

July 6, 1998 – Severe thunderstorm activity dumped rain and hail, and produced funnel clouds and flash floods. The Peerless area reported 2¾-inch hail. It rained so hard near Richland that one-foot of water was flooding across Highway 248, on the Daniels/Valley County border. Highway 13 between Scobey and Wolf Point was impassible due to flooding. (*T-Storms*, Daniels County Leader, July 9, 1998.)

June 1999 – Severe weather hit northeastern Montana. At least three tornado sightings were reported to the NWS, with the most damage in Opheim and in the Fort Peck areas. In Opheim, the front of the Homestead Hotel & Café was partially torn off. Many power poles and lines were down, and numerous trees were uprooted. A number of agricultural buildings were also damaged. (Gov. Marc Racicot papers, August 9, 2000, Montana Historical Society Archives.) NWS storm warnings reached the general public, emergency services, and other vitally interested authorities of northeast Montana. One glaring exception was the community of Opheim, which was struck by an F1 tornado; this location being over 50 miles from the nearest NOAA Weather Radio transmitter and out of range of overage. As a result, authorities and residents of Opheim did not receive the tornado warning in time.

3.1.5 Human-Caused and Technological Hazards

Human-caused hazards are technological hazards (accidental events) and terrorism (intentional acts). These are distinct from natural hazards primarily in that they originate from human activity.

The term “technological hazards” refers to the origins of incidents that can arise from human activities such as the manufacture, transportation, storage, and use of hazardous materials. Technological emergencies are accidental and their consequences are unintended. Examples of technological hazards are industrial accidents at either fixed facilities or transportation, and failure of a critical infrastructure component.

The term "terrorism" refers to intentional, criminal, malicious acts. Terrorism hazards include the use of Weapons of Mass Destruction such as, biological, chemical, nuclear, and radiological weapons; arson, incendiary, explosive, and armed attacks; industrial sabotage and intentional chemical releases; and "cyber terrorism".

Whether intentional or accidental, human-caused disasters involve the application of one or more modes of harmful force to the built environment. These modes are defined as contamination (chemical, biological, radiological, or nuclear hazards), energy (explosives, arson, and electromagnetic waves), or failure or denial of service (sabotage, infrastructure breakdown, and transportation service disruption). The greatest human-caused hazard risk to northeast Montana communities is the large quantities of propane, anhydrous ammonia, and petroleum stored in various locations, and the lack of security at these bulk storage facilities.

3.1.5.1 Location and Extent of Previous Technological Hazard Events

Technological hazards in northeast Montana do not occur with great frequency. However, a bomb scare on the Amtrak train in Wolf Point indicates the region is not immune to terror-related hazards.

February 1996 – Amtrak offices in Philadelphia received notification by phone from a person claiming to have knowledge of a bomb placed on a train headed for western Montana. At that time, the train was 10 minutes out of Wolf Point. The decision was made to evacuate passengers from the train and to allow a search to take place. Once the train was evacuated, it was moved to the east end of town, where it was anticipated than an explosion would cause less property damage. Teams were sent from Great Falls, including a canine search team from Malmstrom and the Explosives Ordinance Disposal team from the Montana Air National Guard. No sign of explosives were found and the train was cleared to continue its journey. (Bomb Scare, Wolf Point Herald News, February 26, 1996.)

The Montana DES Hazardous Material Response Database indicates one record of a human-caused disaster in Daniels County, as summarized below in ***Table 3-5***.

TABLE 3-5

DANIELS COUNTY HUMAN CAUSED HAZARD INCIDENTS

Incident Date	Geographic Location	Incident Specific Information	HazMat Name	Amount
02/06/1998	Fladager #14-11 Salt Water Disposal Well	Disposal pump malfunctioned-transfer pumps continued to operate causing overtopping of storage tank that released saltwater into containment area. Vacuum trucks dispatched to recover product. Facility shutdown pending repairs.	Saltwater-Oil production by-product	300 barrels

3.1.6 Dam Failure

According to the Montana DNRC, over 300 dams exist in northeast Montana. These dams are used for flood control, fire protection, irrigation, and stock watering. Montana DNRC classifies dams in terms of breach damage, as follows: "high" – significant loss of life and property; "significant" – no loss of life and significant property damage; and, "low" – minor property damage. The Army Corps of Engineers classifies dams in terms of failure where "high" or "Category I" would cause significant loss of life and property damage; "significant" or "Category II" would cause one or two losses of life and significant property damage; and "low" or "Category III" would cause minor property damage. Dam failure usually occurs as a secondary effect of storms or earthquakes.

There are no high hazard or Category I dams in Daniels County. The J. Jacobsen #1 dam, located in Section 24, Township 33 North, Range 50 East, is ranked as a significant hazard dam by Montana DNRC. This dam is a privately owned earthen dam, 15 feet in height, which is used for fire protection and as a stock pond.

3.1.6.1 Location and Extent of Previous Dam Failure Events

It is not known how many dams have failed in Montana. The following is a summary of several dam failures in northeast Montana, followed by a description of some of the Class I dams in the area.

Frenchman Creek Dam Failure – Frenchman Creek Dam is located in Phillips County, 20 miles north of Saco. On April 17, 1952, the dam failed as a result of floodwater and exacerbated flooding in the Milk River Valley. The dam was completed in 1951 and had a storage capacity of about 7,000 acre-feet. The dam's main section was 926 feet long and about 40 feet high with a lower dike section at each side of the mid-valley main section. The west dike was purposely built a foot below the crest level of the spillway so that water could escape over it, in case of flooding. About the time the lower dike was overtopped, a breach was detected in the main section near the spillway. This was very small, but apparently widened as water ate through the dam. Three other irrigation dams are located on Frenchman Creek upstream across the international boundary near Val Marie, Saskatchewan. *($150,000 Loss in Frenchman Dam Failure*, Glasgow Courier, April 17, 1952.)

Midway Dam Failure – The Midway dam, 40 miles northwest of Nashua, breached during the March 1939 Porcupine Creek flood when the spillway was undermined by huge floating ice cakes. The dam was built by the Indian Reclamation Service as an irrigation structure. The dam was earth fill, faced with concrete slabs with the spillway in the middle. When the dam failed, a four-foot liquid wall swept down the valley causing extensive damage. (*Nashua Hit Twice From High Water*, Glasgow Courier, March 30, 1939.)

Carrol Dam Failure – The Carrol Dam, located eight miles northwest of Plentywood failed in July 1946 following several inches of rain in a short timeframe. There were no fatalities attributable to the dam failure but destruction was evident throughout the 15 mile valley which took the brunt of the flood. Several homes and farm buildings were destroyed. (*Two Flash Floods Hit Sheridan County*, Plentywood Herald, July 11, 1946.)

3.1.6.2 Existing Dams in the Area

Following is a description of some of the Class I dams in the area.

Box Elder Creek Dam, also known as the Bolster Dam, is owned and operated by the City of Plentywood. The dam was constructed in 1963 to provide flood protection to the city of Plentywood. The 60-foot high earth dam impounds approximately 6,620 acre-feet of water when filled. According to the 1998 inspection report prepared by the Natural Resources Conservation Service (NRCS, 1998), the dam is in excellent condition and is inspected annually. The 1980 inspection report (CH2M Hill, 1980) recommends that a downstream warning system be developed and activated. DNRC has indicated that due to its concrete outlet, the life expectancy of the Box Elder Creek Dam is about 100 years. The dam is currently in full compliance; its "Operations Permit" is due for renewal in September 2003 which will involve a more comprehensive 5-year inspection.

Canadian Power Plant Dam, owned by the Province of Saskatchewan operates a 1,200-million watt coal-fired electric power complex in southern Saskatchewan near the international border with Montana. A strip mine, dam and reservoir for cooling water and four 300-million watt-generating stations were built in the headwaters drainage of the East Fork Poplar River, upstream of Scobey. Failure of the cooling dam structure would impact the Scobey area.

3.1.7 Drought

A drought is an extended period of unusually dry weather. Drought is a special type of disaster because its occurrence does not require evacuation of an area nor does it constitute an immediate threat to life or property. People are not suddenly rendered homeless or without food and clothing. The basic effect of a drought is economic hardship, but it does, in the end, resemble other types of disasters in that victims can be deprived of their livelihoods and communities can suffer economic decline.

The effects of drought become apparent with a longer duration because more and more moisture-related activities are affected. Non-irrigated croplands are most susceptible to moisture shortages. Rangeland and irrigated agricultural lands do not feel the effects as quickly as the non-irrigated, cultivated acreage, but their yields can also be greatly reduced due to drought. Reductions in yields due to moisture shortages are often aggravated by wind-induced soil erosion.

In periods of severe drought, range fires can destroy the economic potential of the livestock industry, and wildlife habitat in, and adjacent to, the fire areas. Under extreme drought conditions, lakes, reservoirs, and rivers can be subject to severe water shortages, which greatly restrict the use of their water supplies. An additional hazard resulting from drought conditions is insect infestation.

3.1.7.1 Description of Previous Drought Events

The history of drought in Montana, as presented in the State of Montana Natural Hazards Mitigation Plan (DES, 2001) is summarized below.

1930's - The 1930's Dust Bowl remains the most highly publicized of past droughts in Montana, but may not necessarily be the worst.

1950's - The mid-1950's saw Montana with a period of reduced rainfall in eastern and central portions of the state. In July of 1956, four counties applied for federal disaster aid due to greatly reduced precipitation amounts since June of the previous year. By November 1956, a total of 20 Montana counties had applied for federal drought assistance.

1960's - Montana saw another drought episode in 1961. By the end of June, 17 counties had requested federal disaster designation due to lack of moisture, higher than normal temperatures, and grasshopper infestation. Small grain crops died before maturing, and range grass and dryland hay crops were deteriorating rapidly. Livestock water supplies were at critical levels. In July of 1961, the State's Crop and Livestock Reporting Service called it the worst drought since the 1930s. In 1966, the entire state experienced another episode of drought.

1980's - Another well-established drought episode occurred in eastern Montana in 1980. Glasgow received only 4.74 inches in the period from June of 1979 to May of 1980. Grasshopper infestations were seen in isolated areas, little wheat was planted, and large numbers of livestock were being sold due to the hay and water shortages. Drought-related economic losses in Montana in 1980 were estimated to be $380 million.

The drought of 1980 continued into the following year. March snowpacks were at 50-60 percent of normal, initiating forecasts of critical water shortages later in the season. Wolf Point received only six inches of precipitation in the 12-month period ending June 1979. The northeast corner of the state, where forty percent of Montana's wheat crop is produced, remained the driest area of the state.

Inadequate moisture supplies were a problem again in 1984. The seven districts involved in the Milk River Irrigation Project were out of water, and crop losses were estimated at $12 - $15 million. August of 1984 saw Montana in flames with numerous range fires burning out of control.

Drought continued to plague the state in 1985 and all 56 counties received disaster declarations. April estimates by the Montana Crop and Livestock Reporting Service put northeast Montana's pasture and range at 32 percent of normal. From 1982 through 1985, cattle herds were reduced by approximately one-third.

The continued lack of moisture in 1985 resulted in a wheat crop that was the smallest in 45 years. Grain farmers received more in government deficiency payments and insurance money than they did for their crops. For a typical 2,500 acre Montana farm/ranch, the operator lost more than $100,000 in equity over the course of that year. The state's agriculture industry lost nearly $3 billion in equity. The extended effects of this drought included the loss of thousands of off-farm jobs, the closing of many implement dealerships and Production Credit Associations.

1990's – Unusual weather conditions in northeast Montana during 1996 wreaked havoc on agricultural producers. Spring arrived late, flooding drowned alfalfa fields, and the summer was dry with rain not coming until it was too late to produce a crop. Severe winter conditions had a negative impact on the local economy, especially livestock producers. Record-setting cold temperatures occurred with snowfall in early November. Livestock feeding began two months early and required increased amounts of hay and supplemental feed. Depletion of hay supplies required that cattle be sold. The Governor requested that haying of CRP land be allowed. (Gov. Marc Racicot papers, January 15, 1997, Montana Historical Society archives).

Agricultural producers in northeast Montana faced severe adverse impacts again in 1998, due to an open winter and very little fall and spring rainfall. Both crop and rangelands were affected, but the most immediate concern was the pasture and range condition. Livestock operations had very limited feed supplies available. In many areas, native range did not green that spring, and many pastures were dormant due to the lack of rainfall and earlier high temperatures. The areas normally hayed for winter feed supplies, were also severely affected. Most areas could not be hayed at all. (Gov. Marc Racicot papers, June 8, 1998, Montana Historical Society archives).

2000's – The U.S. Department of Agriculture issued Natural Disaster Determinations for drought for the entire state of Montana for the years 2000, 2001, and 2002. This designation entitled counties to low interest loans for producers, small business administration loans, and an Internal Revenue Service provision deferring capital gains.

3.1.8 Insect Infestations

The agricultural industry in northeast Montana was particularly hard hit between 1869 and 1875 when grasshoppers completely destroyed crops. One of the most notable grasshopper invasions occurred in 1938 when "clouds of migrant hoppers came riding the wind from the southeast. They boosted populations of between 40 and 500 hoppers per square yard". Losses in the 17 counties affected by the 1938 grasshopper migration were estimated at $6,500,000 (Montana Magazine of Western History, 1985).

3.1.8.1 Description of Previous Insect Infestations

Insect infestations in Daniels County resulted in State disaster declarations in 1986. A description of previous insect infestations in the region is presented below:

July 22, 1975 - Roosevelt County applied for State disaster assistance for abatement of mosquitoes. Assistance was requested to alleviate the infestation in livestock and recreation areas, and because of the health hazard to humans. (Letter to Governor Thomas Judge, Montana Historical Society archives).

July 26, 1975 - Valley County requested aid due to an outbreak of grasshoppers. Grasshoppers had stripped leaves from growing crops and heads from winter wheat, and had devastated gardens. The Opheim/Glentana area reported 60-70 hoppers per square yard in wheat, and the Richland/Larslan area reported 110/120 hoppers per square yard in cut hay fields. Over 40,000 acres were sprayed at a cost of over $129,000. Valley County was declared an emergency due to the plaque of grasshoppers. (Letter to Governor Thomas Judge, Montana Historical Society archives.)

3.1.9 Earthquakes

An earthquake is a trembling of the ground that results from the sudden shifting of rock beneath the earth's crust. Earthquakes may cause landslides and rupture dams. Severe earthquakes destroy power and telephone lines, gas, sewer, or water mains, which, in turn, may set off fires and/or hinder firefighting or rescue efforts. Earthquakes also may cause buildings and bridges to collapse.

Earthquakes occur along faults, which are fractures or fracture zones in the earth across which there may be relative motion. In northeast Montana, several earthquakes have been centered on the Froid-Brockton fault that runs through eastern-Roosevelt and southern-Sheridan County. Seismic risk zones are numbered 0 to 4, with a 4 representing the highest likelihood of a serious earthquake. Northeastern Montana is rated as a 0 on the Seismic Risk Zone scale.

Three quakes of magnitude 3.5 to 4.0 have been recorded in the northeastern Montana area since 1982 and one with a magnitude of 5.0 to 6.0 occurred in 1909. A magnitude 4.0 earthquake, centered about 30 miles north of Brockton, shook eastern Roosevelt County on July 28, 1998. Some residents felt the quake but no damage was reported. (*Mild Earthquake Hits NE Montana*, Daniels County Leader, August 6, 1998; *Earthquake Rocks Eastern Roosevelt County*, Wolf Point Herald, August 6, 1998.)

3.1.10 Aircraft Accidents

The Federal Aviation Administration (FAA) has maintained a database of civil aircraft accidents since 1978. Listings for northeast Montana are presented in ***Table 3-6***. No database listings for northeast Montana airports resulted in fatalities.

TABLE 3-6
NORTHEAST MONTANA AIRCRAFT ACCIDENTS FROM FAA DATABASE

Event Date	Airport Name	Aircraft Damage	Aircraft Make	Operator	Primary Flight Type	Fatalities	Injuries
11/27/02	L M Clayton/Wolf Pt	None	Fairchild	Big Sky	Commercial	0	0
09/14/00	L M Clayton/Wolf Pt	Minor	Cessna	Private	Personal	0	0
02/18/96	Wokal Field/Glasgow	Minor	Cessna	Private	Personal	0	0
10/05/95	Wokal Field/Glasgow	Minor	Swrngn	Big Sky	Air Taxi	0	0
12/29/94	Wokal Field/Glasgow	None	Swrngn	Big Sky	Air Taxi	0	0
09/18/94	Wokal Field/Glasgow	None	Swrngn	Big Sky	Air Taxi	0	0
08/20/91	Wokal Field/Glasgow	Minor	Beech	Private	Business	0	0
07/23/90	Wokal Field/Glasgow	Minor	Swrngn	Big Sky	Air Taxi	0	0
02/02/89	Wokal Field/Glasgow	None	Cessna	Big Sky	Air Taxi	0	0
04/03/88	Wokal Field/Glasgow	None	Cessna	Big Sky	Air Taxi	0	0
02/09/88	L M Clayton/Wolf Pt	None	Cessna	Big Sky	Air Taxi	0	0
10/31/83	L M Clayton/Wolf Pt	Minor	Beech	Private	Air Taxi	0	0
10/11/81	Wokal Field/Glasgow	Minor	Piper	Private	Personal	0	0

An aircraft accident involving four Plentywood residents occurred in 1962, as summarized below.

April 8, 1962 - Four Plentywood men were killed when the light plane in which they were flying crashed into a farm field about 6½ miles east of Circle Montana. According to FAA officials from Billings, a violent spring blizzard was blamed as the apparent cause of the tragedy. Authorities said the plain struck the earth at an extreme nose-low altitude with tremendous force and was completely demolished except for a potion of the tail assembly. (*Four Killed In Plane Crash*, Plentywood Herald, April 12, 1962).

3.1.11 Civil Unrest

Civil unrest in not a common hazard affecting Montana; however, Garfield County made national news during the Montana Freemen crisis. In the early spring of 1996, hundreds of FBI agents surrounded the Ralph Clark ranch complex near Jordan, Montana for a total siege of 81 days. The government claimed that the nearly thirty people inside were of a radical anti-government and racist religious sect who had written bad checks and threatened judges, among other things.

3.1.12 Energy Shortage

Energy shortage is a hazard that threatens northeast Montana, as well as the entire U.S. The Arab oil embargo in 1973 and the California energy shortage of 2000 are two examples. These events are summarized below.

On October 17, 1973 OPEC imposed an oil embargo on the U.S. The embargo came at a time when 85% of American workers drove to their places of employment each day. President Nixon set the nation on a course of voluntary rationing. He called upon homeowners to turn down their thermostats and for companies to trim work hours. Gas stations were asked to hold their sales to a max of ten gallons per customer. In the month of November 1973, Nixon proposed an extension of Daylight Savings Time and a total ban on the sale of gasoline on Sunday's. A severe recession hit U.S., and gasoline lines snaked their way around city blocks (the price at the pump had risen from 30 cents a gallon to about $1.20 at the height of the crisis).

In early December 2000, the state of California was faced with the threat of rolling blackouts for several weeks because of skyrocketing electricity prices and a shortage of power supplies from out of state. The State's move to deregulate its electricity industry and the state's failure to construct new power plants was blamed for the electricity shortage.

3.2 HAZARD PRIORITIZATION

Between 1986 and the present, six federal and/or state disasters have been declared in Daniels County. Declared disasters have included two floods, two wildfires, one severe winter storm, and one grasshopper infestation. Further information on these disaster events is presented in subsequent sections of this Plan.

Public meetings were held in the Daniels County community of Scobey. Additionally, meetings and interviews were held with public officials numerous times during development of the plan. Generally, Daniels County residents identified winter storms, wildfire, and windstorms are their primary hazards. Hazards discussed and evaluated during the interviews and public meetings are presented in ***Table 3-7.***

TABLE 3-7
HAZARDS EVALUATION DURING PDM PLAN DEVELOPMENT

Natural Hazards	**Geologic Hazards**	**Hydrologic Hazards**
Thunderstorms & Lightning	Landslides	Floods
Tornadoes	Land Subsidence	Flashfloods
Windstorms	Earthquakes	Erosion
Hailstorms	Volcanic Eruption	
Severe Winter Storms	Expansive Soils	**Technological Hazards**
Avalanches		Dam Failure
Extreme Heat and Cold	**People-Specific Hazards**	Power Failure
Wildfire	Bomb Threats	Nuclear Accidents
Insect Infestation	Terrorism	Nuclear Attacks
	Hostage Situation	Energy Shortage
Biological Hazards	School/Business Violence	Fixed Site (drug labs, pipelines, refineries, USTs, etc.)
West Nile Virus	Cyber-terrorism	
Hanta Virus	Civil Disturbance	Transportation (railway, roadway, waterway, airway)
	Airplane accident	

Hazard prioritization was accomplished by determining which hazards had caused prior fatalities; resulted in property damage; had the potential to cause the most economic hardship within the County; and, had the potential to affect Daniels County residents in the future. Based on review of the historical record and local knowledge, Daniels County identified four major hazards that consistently affect this geographic area – flooding, wildfires, severe winter storms and extreme cold, and, severe thunderstorms including high winds, hail and tornadoes. The threat of hazardous material incidents is a technological hazard present in Daniels County due to transportation corridors (e.g. highway, railroad) through the area. Security of infrastructure from terrorism was also identified as a technological hazard of concern.

3.3 ASSESSING VULNERABILITY: IDENTIFYING ASSETS & VULNERABLE POPULATIONS

Assessing vulnerability requires understanding the location and importance of those things that the community values. For purposes of this risk assessment, building structural values, buildings that house critical services to the community, and people, were identified as valued community resources. To assess the vulnerability of these community assets, a model of their locations and characteristics was developed to be used in conjunction with hazard profiles for performing the risk assessment.

3.3.1 Building Values

Analysis of building stock values is based on the building stock data available from the FEMA HAZUS software. The documentation for this data is provided in ***Appendix E***. Building stock data available in HAZUS was compiled at the census track level. Due to the largely rural nature of this project area, census tracks do not provide a high enough resolution to differentiate one area from another for hazard assessment. To allow analysis of building stock values at the census block level the building stock structure values were assigned to census blocks in the same proportion that a given block represents the percentage of population in the track. ***Map 3-1*** shows building stock values by census block.

3.3.2 Critical Facilities and Infrastructure

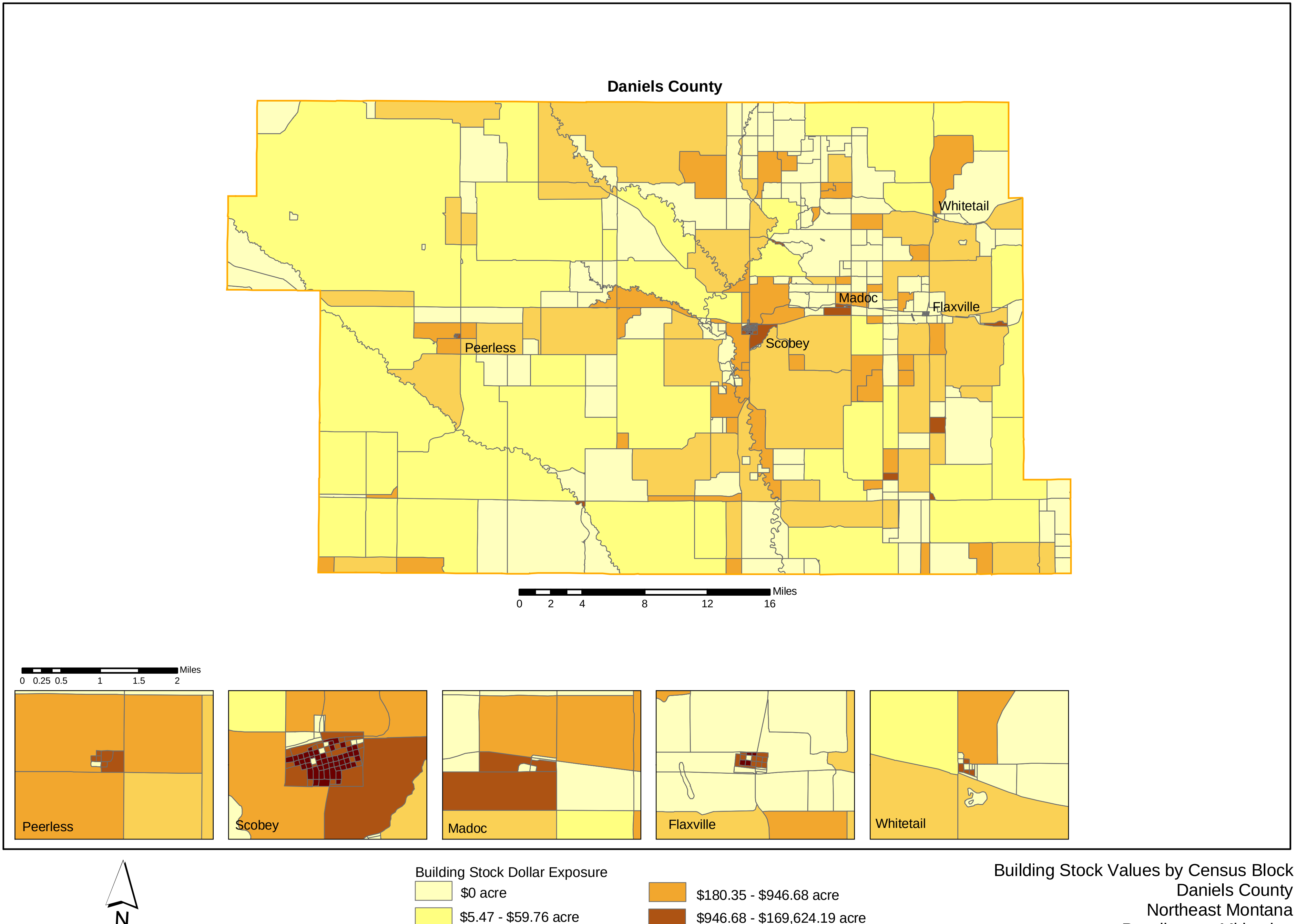
Critical facilities are of particular concern because they provide, or are used to provide, essential products and services that are necessary to preserve the welfare and quality of life and fulfill important public safety, emergency response, and/or disaster recovery functions.

Critical facilities are defined as facilities critical to government response and recovery activities (i.e., life safety and property and environmental protection). Critical facilities include: 911 emergency call centers, emergency operations centers, police and fire stations, public works facilities, sewer and water facilities, hospitals, bridges and roads, and shelters; and facilities that, if damaged, could cause serious secondary impacts (i.e., hazardous material facility). Critical facilities also include those facilities that are vital to the continued delivery of community services or have large vulnerable populations. These facilities may include: buildings such as the jail, law enforcement center, public services buildings, community corrections center, the courthouse, and juvenile services building and other public facilities such as hospitals, nursing homes and schools. ***Appendix C*** lists critical facilities in Daniels County.

Critical facilities data were obtained by mapping the FEMA HAZUS critical facilities data and then having the maps reviewed, corrected, and enhanced during public meetings. Accurate location information was not available for many of the critical facilities listed in ***Appendix C***. Only those facilities that could be located accurately were included in the analysis. To provide a uniform analysis, critical facilities were assigned to the appropriate census block and the block was given a score based on the number of critical facilities it contains.

3.3.3 Future Growth and Land Use Trends

Daniels County has been steadily loosing population since 1930. The U.S. Census indicates that between 1990 and 2000, Daniels County lost 11% of its population. The Daniels County Planner suggests that this trend will continue into the future.



Building Stock Dollar Exposure

- $0 acre
- $5.47 - $59.76 acre
- $59.76 - $180.35 acre
- $180.35 - $946.68 acre
- $946.68 - $169,624.19 acre
- $169,624.19 - $551,570.00 acre

Building Stock Values by Census Block
Daniels County
Northeast Montana
Pre-disaster Mitigation
Map 3-1

Agriculture is the basis of the Daniels County economy and this trend is also not expected to change in the future. A Local Development Corporation exists to promote the growth of industry in the County and to provide assistance to entrepreneurs and small businesses. No projects are currently being considered. Although local officials have indicated that there are no future buildings, infrastructure or critical facilities proposed that would be located in identified hazard areas, mitigation options will be considered in future land use decisions.

An economic development project taking place on the Fort Peck Indian Reservation that will provide positive impacts to portions of Daniels County is described below.

Dry Prairie Rural Water System, a municipal, rural, and industrial project that will provide an adequate supply of good—quality water for domestic and industrial use and for livestock water in the Fort Peck Reservation and Dry Prairie service areas. The project will consist of a water withdrawal intake and treatment plant near the community of Poplar, and pumping stations, pipelines, storage tanks, power lines, and other ancillary facilities that will serve a future population of about 30,000 people with water from the Missouri River.

3.3.4 Vulnerable Populations

A significant factor in the impact of any hazard is the effect it has on people. The severity of the impact is related to the intensity of the hazard, the population affected, and the population's ability to protect itself. To model the ability to self-protect and recover from hazards, age and indicators of economic well being were used. The population data used to develop the vulnerability model was derived from the 2000 Census. To model overall vulnerability the following equation was used:

- Score = (societal variable for block / total societal variable in jurisdiction) / maximum societal variable for any block in the jurisdiction)

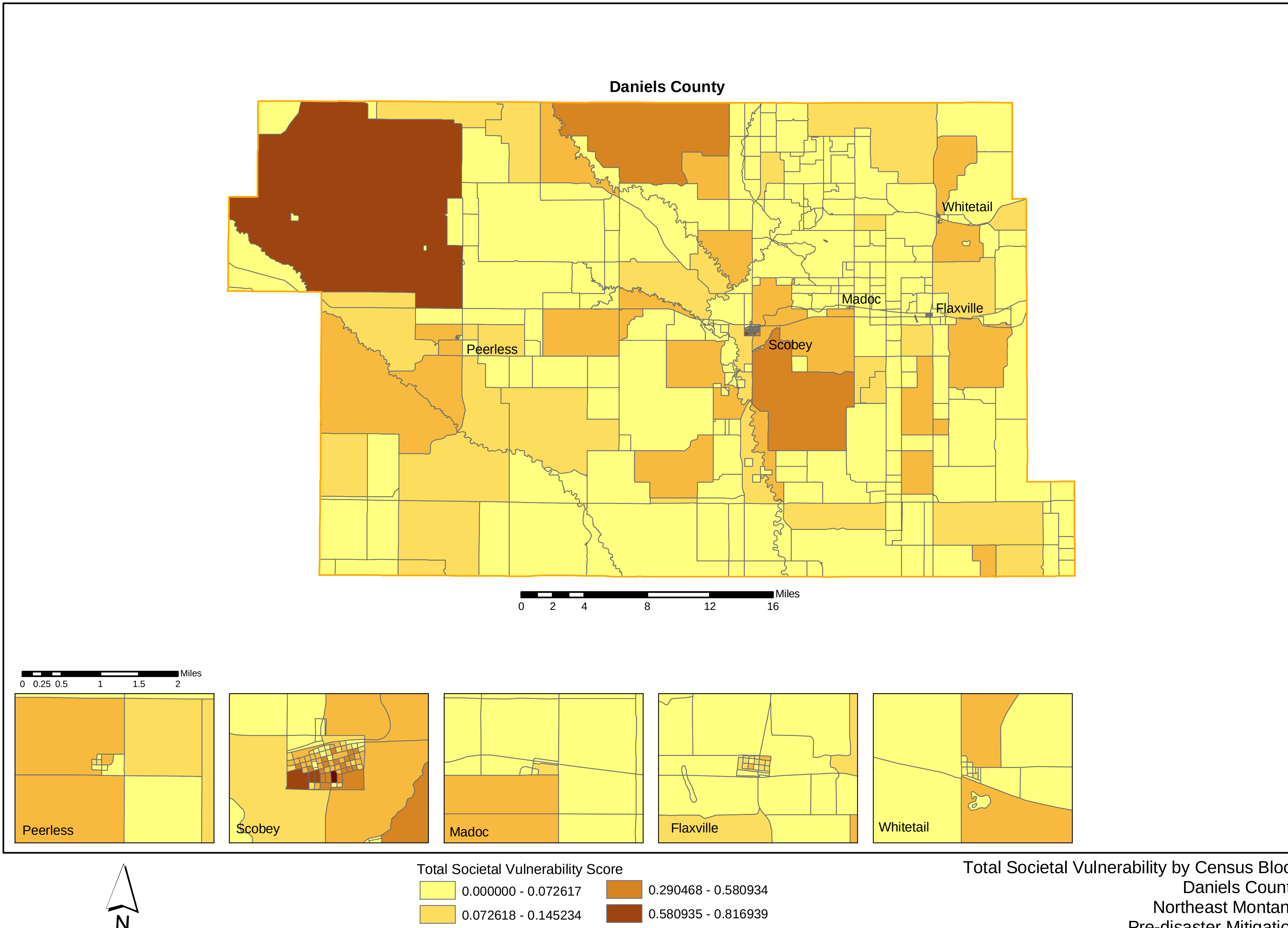
This formula creates a score for each variable that is based on the percentage of that variable in the jurisdiction and is normalized to a scale that is the same as the other variables. The societal variables that were used to determine the overall societal vulnerability per census block were:

- Population Density
- Age > 65
- Age < 18
- Income < Poverty Level
- No High School
- Population with Disabilities
- Population on Public Assistance

Each block was assigned a score for each societal vulnerability and an overall societal vulnerability by adding the individual societal vulnerability scores and dividing by seven, which is the total number of variables evaluated. ***Map 3-2*** depicts total societal vulnerability by census block.

3.4 HAZARD PROFILES

Hazard profiles define the frequency, location, and intensity of hazards that may impact a community. Profiles were developed for hazards that historically have had the most effect on the community and the ones that the community identified as being of most concern during public meetings.



Total Societal Vulnerability by Census Block
Daniels County
Northeast Montana
Pre-disaster Mitigation
Map 3-2

3.4.1 Hazard Frequency

The frequency of past hazard events was calculated to determine the probability of future hazards occurring. Accurate and consistent records have not been kept for many hazards. Where records have been kept, they are often heavily biased towards only reflecting hazards that occurred in the more populated areas of the jurisdiction. This is especially problematic in areas like Daniels County that are largely rural.

Data from the NOAA National Climate Data Center Storm Events database and the Montana DES was used to compile frequencies of natural hazards. The complete listing of events from this database can be found in ***Appendix F***.

TABLE 3-8
DANIELS COUNTY HAZARD FREQUENCIES

Hazard	Number of Events	Period of Record In Years	Frequency In Years
Flooding	8	9	.89
Winter Storms	17	9	1.9
*Wildfire	724	8	90.5
Tornadoes	11	52	.21
Wind/Thunderstorms/Hail	81	47	1.7
**Technological	2	5	0.4

NOTES: *Compiled from data provided by DES and represents a regional frequency.
** Compiled from DES HAZMAT Response Database

3.4.2 Hazard Impact Areas

Hazard impact areas describe the geographic extent a hazard can impact in a jurisdiction and are uniquely defined on a hazard-by-hazard basis as discussed below. For purposes of conducting the risk analysis, all the hazard impact areas were defined as the percentage of area in each census block that would be affected.

3.4.2.1 Flooding

Ideally flooding would be modeled by using floodplain maps. The types of floodplain maps required to model flooding in a Geographic Information System (GIS) are vector representations of the floodplain boundaries like the FEMA Q3 maps. Currently, there are no FEMA Q3 digital flood data for the project area. In order to conduct an analysis of flood impacts, a generalized model of potential flood areas was developed by reviewing the existing flood plain maps and modeling them using data that does exist. Potential flooding areas of impact were created by identifying all rivers and streams upstream of a major flood control dam, and buffering them using the following criteria:

- Rivers 2500 feet each side
- Streams 1750 feet each side
- Intermittent 750 feet each side

The buffered areas were then intersected with the census blocks in the GIS to define area of impact by block. ***Map 3-3*** depicts the percentage of area potentially impacted by flooding by census block. The disadvantage to this method is that it is fairly general and doesn't adequately address known flood prone areas. The advantages of this method are that the floodplain models are at a comparable level of spatial resolution to the data that they are being used to analyze (census blocks) and that it is not biased to only account for flood areas that currently are impacting structures.

3.4.2.2 Winter Storms

The entire project area is in a single climate region (BSk) according to the Köppen Climate Classification for the Conterminous United States developed by the Idaho State Climate Services Center at the University of Idaho. Characteristics of the BSk classification are:

- Semi-Arid, Steppe (Cool)
- Evaporation Exceeds Precipitation on Average
- Precipitation is More than Half but Less than Potential Evaporation
- Mean Average Temp is Below 18c/64.4f

Topographically there are no significant features that generate localized climate conditions that present significant changes in hazard risk in the project area. Therefore the hazard profile area for winter storms is the entire project area.

3.4.2.3 Wildfire

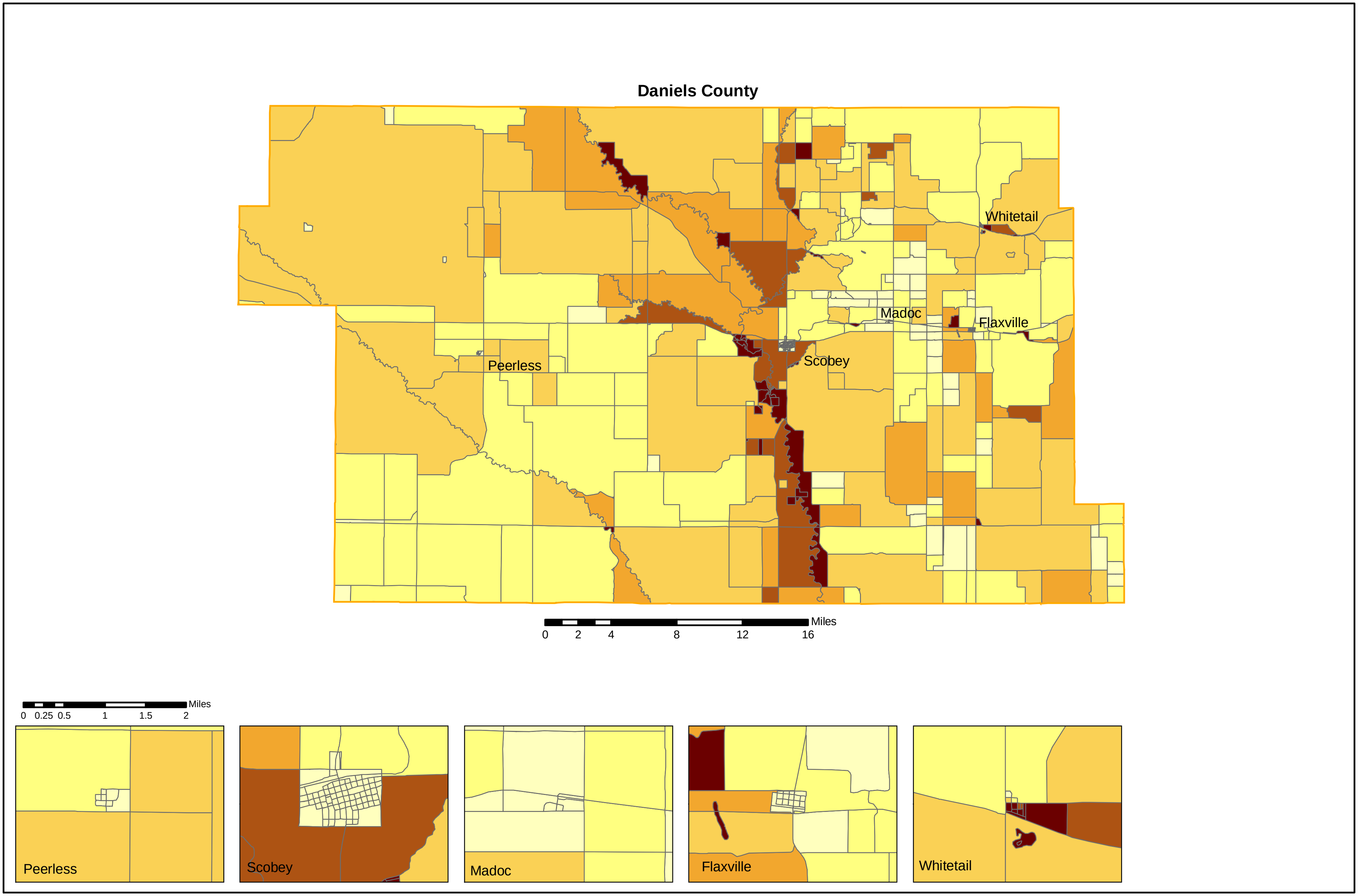
Grass and brush fires represent the greatest wildland fire risk for the project area. According to the Urban Wildland Interface Code: 2000 published by the International Fire Code Institute (IFCI) a "Light Fuel" is vegetation consisting of herbaceous plants and round wood less than ¼ inch in diameter – Grassland would fall in this category. Grassland in the project area is mainly composed of grazing land and farmland that is currently in the NRCS Conservation Reserve Program (CRP land). Because there is a significant amount of land in the CRP program in the project area and land is consistently being added and retracted from the CRP, all agricultural land was classified as potential wildfire risk areas. A Medium Fuel according to the Urban Wildland Interface Code: 2000 is vegetation consisting of round wood 1/3 to 3 inches in diameter. Shrub and grassland in the project area fit into this category.

The National Land Cover Data from the US Geological Survey (USGS) was used to define agricultural, grass, and shrub land for the project area. ***Map 3-4*** depicts fire risk areas. Data from the USFS Wildland Fire Assessment System were also evaluated for use in modeling fire risk but was determined to be too general for the project area.

3.4.2.4 Severe Thunderstorms

According to FEMA's wind zone classifications the entire project area is in Zone II (160 MPH Design Wind Speeds). According to FEMA the project area also has a single classification for tornado frequency (<1 Per 1000 square miles).

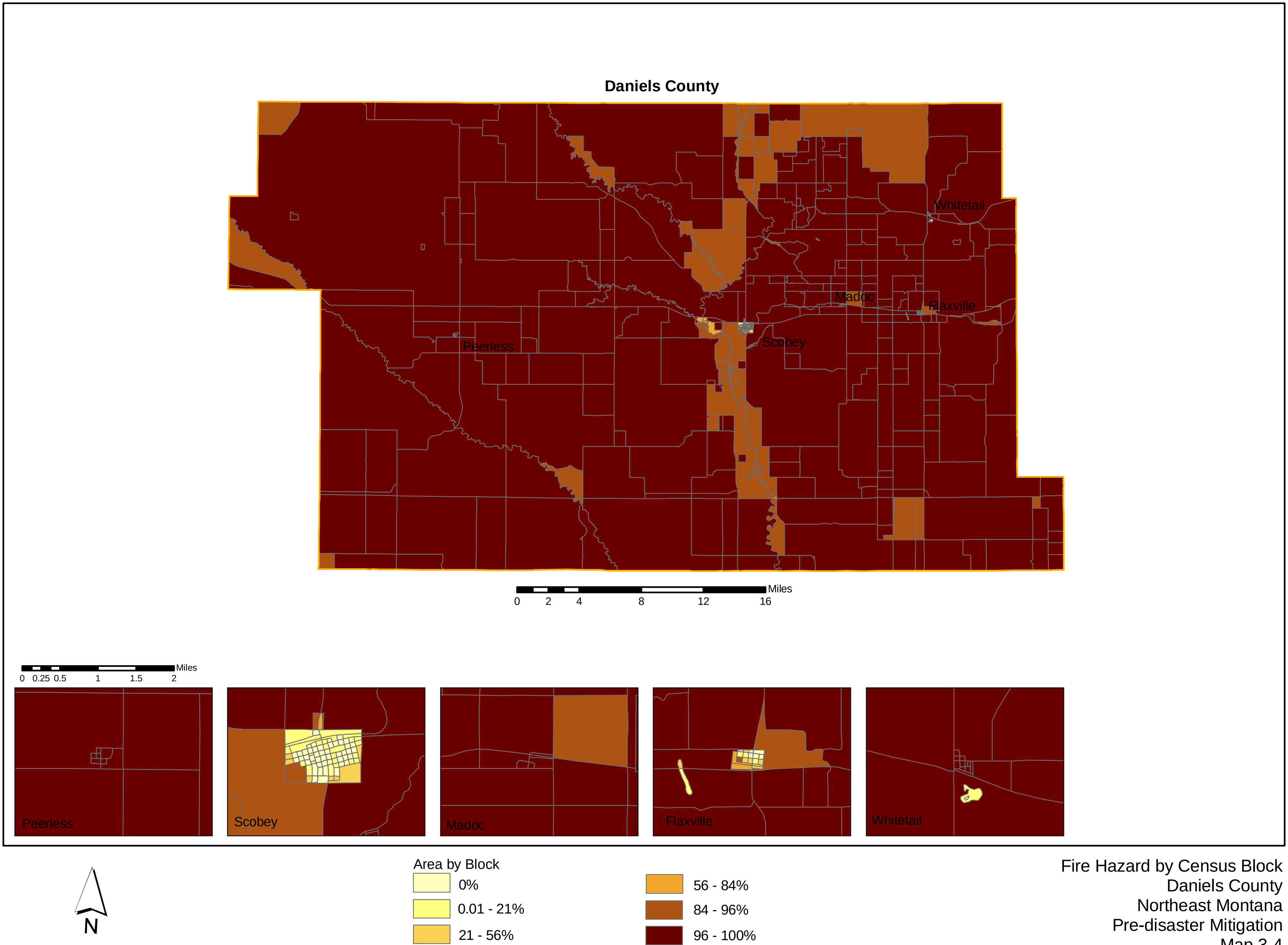
Based on review of weather data and the determinations made for tornadoes, windstorms and winter storms, the entire project area has been classified with a uniform risk for severe thunderstorms including tornadoes and hail.



N

Area by Block
- 0%
- 0.01 - 20%
- 20 - 40%
- 40 - 60%
- 60 - 80%
- 80 - 100%

Flooding Hazard by Census Block
Daniels County
Northeast Montana
Pre-disaster Mitigation
Map 3-3



Fire Hazard by Census Block
Daniels County
Northeast Montana
Pre-disaster Mitigation
Map 3-4

3.4.2.5 Human-Caused and Technological Hazards

Based on review of historical accounts of human-caused and technological hazards, the DES Hazardous Material Response database, and input from the public meetings, it was determined that a significant component of risk in this category was related to transportation of hazardous materials and transportation infrastructure. To model the spatial distribution of this risk we developed a GIS data layer of major transportation arteries, which included highways and railroad lines, buffered them by 0.25 miles, and then calculated the impact area by census block. ***Map 3-5*** depicts Transportation Related Technological Risk Areas.

3.4.2.6 Cumulative Hazard Areas

Cumulative hazards for the project area were calculated by summing the percent of each census block that contained flooding, fire, and transportation hazards. Other hazards where not included because they were determined to have uniform spatial distribution across the project area. ***Map 3-6*** depicts cumulative hazard areas by census block.

Estimating potential losses and calculating risk requires evaluating where hazard areas and vulnerabilities to them coincide, how frequently the hazards occur, and then estimating the magnitude of damage resulting from a hazard event.

3.5 ASSESSING VULNERABILITY: ESTIMATING POTENTIAL LOSSES

3.5.1 Hazard Magnitudes

The percentage of structures or people exposed to a hazard who are negatively impacted is related to the nature of the hazard and intensity of the event and is expressed as the hazard magnitude. The hazard magnitude is required to develop estimates of structures and people impacted by the hazard. For this risk assessment, hazard magnitude estimates were developed by researching historical disaster records and other relevant data related to hazard intensity. Hazard magnitudes are expressed as a percent of structures or people impacted.

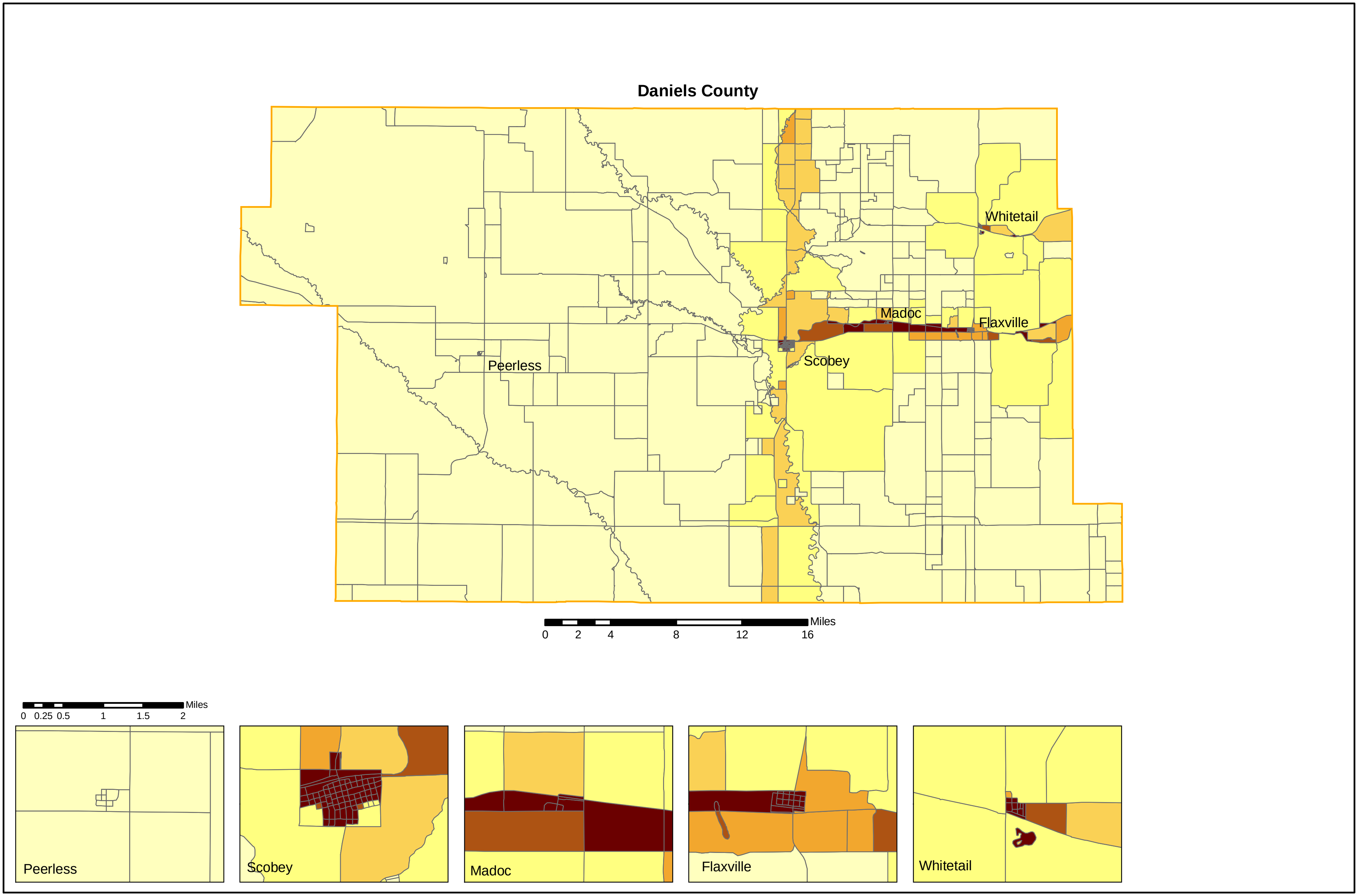
3.5.2 Risk Calculations

Risk calculations present a quantitative assessment of the vulnerability of structures, people, and critical facilities to individual hazards and cumulatively to all hazards. The equation used to develop the overall risk values is:

- Exposure x Frequency x Hazard Loss Magnitude

Where :

- Exposure = structures, vulnerable population, or critical facilities at risk as determined in ***Plan Section 3.4.2***
- Frequency = annual number of events determined by calculating the (number of hazard events / period of record) as described in ***Plan Section 3.4.1***
- Magnitude = percent of damage expected as described in ***Plan Section 3.5.1*** and presented in ***Table 3-9***

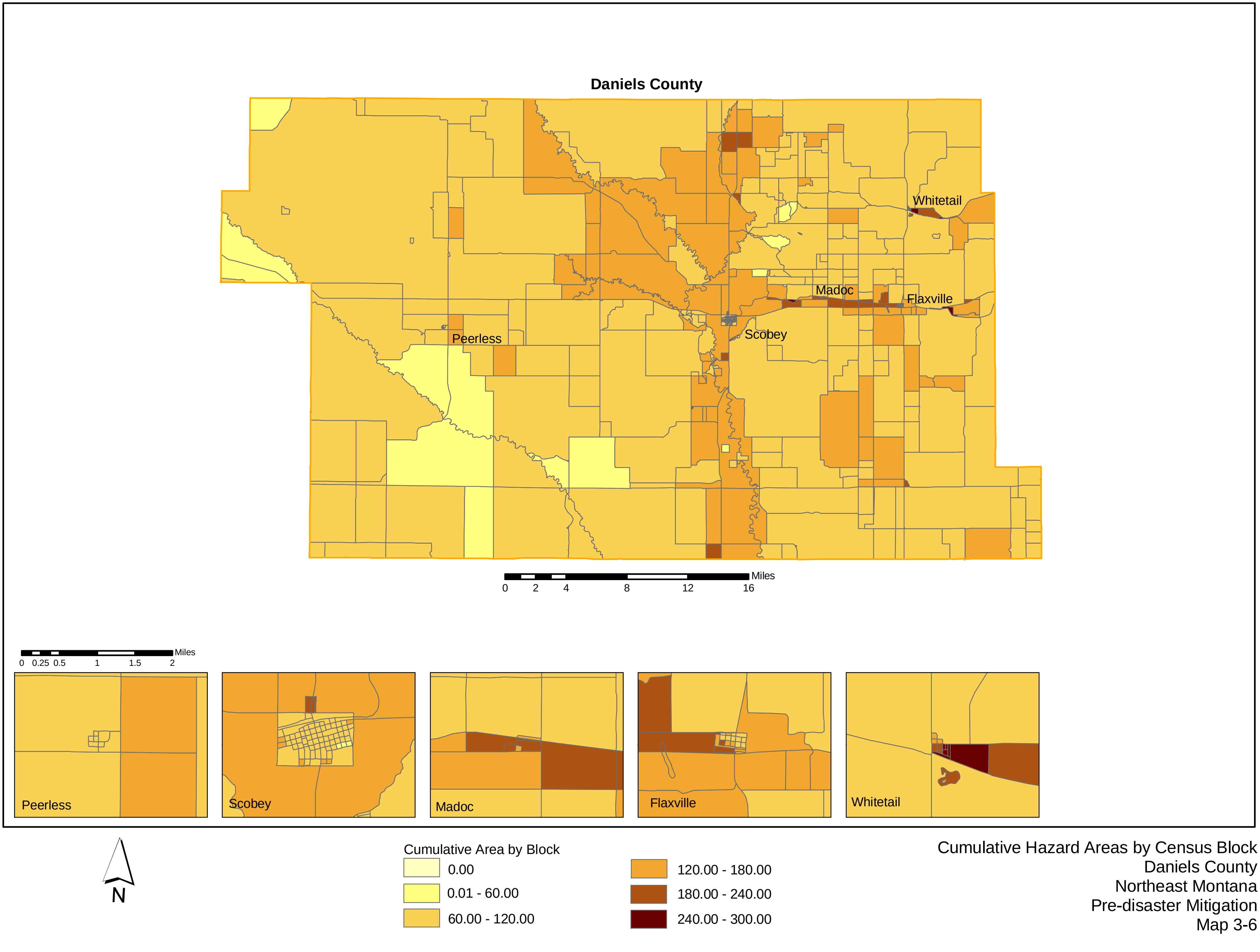


N

Area by Block

- 0%
- 0.01 - 20%
- 20 - 40%
- 40 - 60%
- 60 - 80%
- 80 - 100%

Transportation Hazard by Census Block
Daniels County
Northeast Montana
Pre-disaster Mitigation
Map 3-5



Cumulative Hazard Areas by Census Block
Daniels County
Northeast Montana
Pre-disaster Mitigation
Map 3-6

Table 3-9 presents the results of the risk calculations for all of Daniels County. While the results are presented as dollar values for Building $ Risk, numbers of people effected for Societal Risk, and numbers of facilities effected, they should not be interpreted literally as estimates of actual values. Due to data and modeling limitations the values presented are more appropriately used to evaluate the relative risk posed by the different hazard types. **Tables 3-10 and 3-11** contain the risk calculations for the Daniels County towns of Flaxville and Scobey.

TABLE 3-9
DANIELS COUNTY
HAZARD VULNERABILITY ASSESSMENTS

Hazard	Frequency	Magnitude	Building $ Exposure	Societal Exposure	Critical Facilities Exposure	Building $ Risk	Societal Risk	Critical Facilities Risk
Flooding	0.89	20.00%	$17,094,658	229.13	0.75	$3,042,849	40.78	0.13
Winter Storms	1.9	2.00%	$140,883,000	2040.00	30.00	$5,353,554	77.52	1.14
Wildfire	90.5	0.15%	$66,520,530	894.93	3.79	$9,030,162	121.49	0.51
Tornadoes	0.21	0.50%	$140,883,000	2040.00	30.00	$147,927	2.14	0.03
Wind/Hail Thunderstorms	1.7	0.10%	$140,883,000	2040.00	30.00	$239,501	3.47	0.05
Technological	0.4	0.10%	$78,539,904	1,198	27.10	$31,416	0.48	0.01
Cumulative			$584,804,091	$8,442	$122	$17,845,409	245.88	1.88

TABLE 3-10
FLAXVILLE
HAZARD VULNERABILITY ASSESSMENTS

Hazard	Frequency	Magnitude	Building $ Exposure	Societal Exposure	Critical Facilities Exposure	Building $ Risk	Societal Risk	Critical Facilities Risk
Flooding	0.89	20.00%	$0	0.00	0.00	$0	0.00	0.00
Winter Storms	1.9	2.00%	$6,076,758	81.12	0.00	$230,917	3.08	0.00
Wildfire	90.5	0.15%	$1,558,636	20.81	0.00	$211,585	2.82	0.00
Tornadoes	0.21	0.50%	$6,076,758	81.12	0.00	$6,381	0.09	0.00
Wind/Hail Thunderstorms	1.7	0.10%	$6,076,758	81.12	0.00	$10,330	0.14	0.00
Technological	0.4	0.10%	$5,939,223	79	0.00	$2,376	0.03	0.00
Cumulative			$25,728,133	343	0	$461,588	6.16	0.00

TABLE 3-11 ***SCOBEY*** ***HAZARD VULNERABILITY ASSESSMENTS***								
Hazard	**Frequency**	**Magnitude**	**Building $ Exposure**	**Societal Exposure**	**Critical Facilities Exposure**	**Building $ Risk**	**Societal Risk**	**Critical Facilities Risk**
Flooding	0.89	20.00%	$1,056,343	16.67	0.00	$188,029	2.97	0.00
Winter Storms	1.9	2.00%	$77,880,290	1211.33	27.00	$2,959,451	46.03	1.03
Wildfire	90.5	0.15%	$8,867,080	137.5	0.83	$1,203,706	18.67	0.11
Tornadoes	0.21	0.50%	$77,880,290	1211.33	27.00	$81,774	1.27	0.03
Wind/Hail Thunderstorms	1.7	0.10%	$77,880,290	1211.33	27.00	$132,396	2.06	0.05
Technological	0.4	0.10%	$68,276,176	1,059	26.98	$27,310	0.42	0.01
Cumulative			$311,840,469	4,847	109	$4,592,667	71.42	1.22

4.0 MITIGATION STRATEGY

Specific mitigation goals and projects were developed for Daniels County in conjunction with the public meeting held in Scobey and stakeholder interviews. A matrix developed for project ranking that emphasized cost-benefit and input from local officials was used to determine project prioritization. Following is a description of goals and objectives used to mitigate natural and technological hazards that builds on the community's existing capabilities. Project implementation and legal framework are discussed at the conclusion of this section.

4.1 LOCAL HAZARD MITIGATION GOALS

The Plan goals describe the overall direction that Daniels County agencies, organizations, and citizens can take to work toward mitigating risk from natural and technological hazards. Goals and objectives of the Plan were developed during interviews and meetings with public officials and at the public meeting held in Scobey. Daniels County hazard mitigation goals are identified below with reference to the specific jurisdiction identifying each as their goal.

- Enhance Emergency Response Systems
- Enhance Early Warning Systems
- Reduce Impacts from Flooding
- Minimize Risk of Wildfire at Urban Interface
- Improve Fire Fighting Capabilities
- Reduce Risk of Hazardous Material Incidents
- Reduce Risk of Biological Hazards

4.2 MITIGATION OBJECTIVES AND ACTIONS

The broad range of potential mitigation activities presented in ***Appendix D*** were considered, and below is a list of mitigation objectives and the actions (projects) identified by the County. Projects marked with an asterisk are response-related actions identified as County priorities. Although these projects may not be eligible for FEMA funding, Counties may secure alternate funding sources to implement these projects in the future.

Enhance Emergency Response Systems

- *Obtain emergency generators to power sirens
- *Obtain mobile generators to pump fuel for response vehicles
- Install pigtails (electrical wiring) and 2-way switches at critical facilities to accommodate mobile generators

Reduce Impacts from Flooding

- Replace old bridges and culverts and improve roads to withstand flash floods

Enhance Early Warning Capabilities

- Obtain information on Canadian power plant cooling dam upstream of Scobey and develop program for alerting residents in case of emergency
- Rebroadcast NOAA weather channel on local KCGM radio station
- *Obtain generator for radio station
- Update siren systems in rural communities
- Buy weather radios for various critical facilities
- Provide weather radios at discount to area residents

Minimize Risk of Wildfire at Urban Interface

- Remove old abandoned buildings around towns
- Develop alternate water supplies to fight fires in towns
- Institute weed control measures (mowing) around towns
- Hay CRP land that surrounds all towns in County
- Construct a fire break network for certain CRP locations

Improve Fire Fighting Capabilities

- Install dry hydrants in fields and develop access roads
- Recruit for volunteer fire departments
- Increase water storage capacity to enhance fire fighting capability

Reduce Risk of Hazardous Material Incidents

- Relocate anhydrous ammonia tank currently adjacent to town of Scobey
- Secure fertilizer and propane plants to reduce authorized access
- Provide awareness training on meth-labs

Reduce Risk of Biological Hazards

- Investigate mitigation options for West Nile Virus

4.3 PROJECT RANKING AND PRIORITIZATION

A cost-benefit matrix was developed to rank the mitigation projects using the following criteria. Each project was assigned a "high", "medium", or "low" rank for *Population Impacted, Property Impacted*, and *Cost*. For the *Population Impacted* category, a "high" rank represents greater than 50 percent of County residents; a "medium" rank represents 20 to 50 percent of County residents; and a "low" rank represents less than 20 percent of County residents. For the *Property Impacted* and *Project Cost* categories, a "high" rank represents greater than $500,000, a "medium" rank represents between $100,000 and $500,000, and a "low" rank is less than $100,000. The matrix was completed by assigning each rank a numeric value as follows:

TABLE 4-1
COST-BENEFIT SCORING MATRIX

	Population Impacted	**Property Impacted**	**Cost**
High	7	7	1
Medium	5	5	5
Low	1	1	7

The overall cost-benefit was then calculated by summing the total score for each project. ***Table 4-2*** presents the Hazard Mitigation Project Cost-Benefit Matrix for Daniels County.

The DES Coordinator, consulting with the Local Emergency Planning Committee (LEPC), also ranked each mitigation project as "high", "medium", and "low" based on community priorities. Projects identified by Daniels County as top priorities and their cost/benefit ranking, are presented in ***Table 4-3.***

TABLE 4-2
DANIELS COUNTY COST/BENEFIT RANKING OF HAZARD MITIGATION PROJECTS

GOAL	HAZARD MITIGATION PROJECTS	HAZARDS MITIGATED	SCOBEY JURISDICTION	FLAXVILLE JURISDICTION	DANIELS COUNTY JURISDICTION	POPULATION IMPACTED	PROPERTY IMPACTED	COST	COST/BENEFIT RANKING
Minimize Risk of Wildfire at Urban Interface	Negotiate over haying CRP land that surrounds all towns in County	Fire	X	X	X	High	High	Low	High
Minimize Risk of Wildfire at Urban Interface	Construct a fire break network around towns and for certain CRP locations	Fire	X	X	X	High	High	Low	High
Enhance Emergency Response Systems	Install pigtails (electrical wiring) and 2-way switches at critical facilities to accommodate mobile generators	Fire, Flooding, Winter Storms, Tornadoes	X	X		High	Low	Low	High
Reduce Impacts from Flooding	Replace old bridges and culverts and improve roads to withstand flash floods	Flooding			X	Medium	Medium	High	Medium
Enhance Emergency Response Systems	Obtain emergency generators to power sirens	Fire, Flooding, Winter Storms, Tornadoes	X	X	X	High	High	Low	High
Enhance Early Warning Capabilities	Obtain generator for radio station	Fire, Flooding, Winter Storms, Tornadoes	X	X	X	High	High	Low	High
Enhance Early Warning Capabilities	Rebroadcast NOAA weather channel on local KCGM radio station	Fire, Flooding, Winter Storms, Tornadoes	X	X	X	High	High	Low	High
Enhance Early Warning Capabilities	Update sirens system in rural communities	Fire, Flooding, Winter Storms, Tornadoes	X	X	X	Low	Low	Low	Medium
Improve Fire Fighting Capabilities	Recruit for volunteer fire departments	Fire	X	X	X	Low	Medium	Low	Medium
Improve Fire Fighting Capabilities	Increase water storage capacity to enhance fire fighting capability	Fire	X	X	X	High	High	Medium	High
Enhance Early Warning Capabilities	Buy weather radios for various critical facilities	Fire, Flooding, Winter Storms, Tornadoes	X	X	X	High	High	Low	High
Enhance Early Warning Capabilities	Provide weather radios at discount to area residents	Fire, Flooding, Winter Storms, Tornadoes	X	X	X	High	High	Low	High
Enhance Early Warning Capabilities	Obtain information on Canadian Power Plant cooling dam upstream of Scobey and develop program for alerting residents in case of emergency	Flooding			X	High	High	Low	High
Minimize Risk of Wildfire at Urban Interface	Develop alternate water supplies to fight fires in towns	Fire	X	X	X	High	High	Medium	High
Improve Fire Fighting Capabilities	Install dry hydrants in fields and develop access roads	Fire			X	Medium	Medium	Medium	Medium
Enhance Emergency Response Systems	Obtain mobile generators to pump fuel for response vehicles	Fire, Flooding, Winter Storms, Tornadoes	X	X		Medium	High	Low	High

TABLE 4-2
DANIELS COUNTY COST/BENEFIT RANKING OF HAZARD MITIGATION PROJECTS

GOAL	HAZARD MITIGATION PROJECTS	HAZARDS MITIGATED	SCOBEY JURISDICTION	FLAXVILLE JURISDICTION	DANIELS COUNTY JURISDICTION	POPULATION IMPACTED	PROPERTY IMPACTED	COST	COST/BENEFIT RANKING
Minimize Risk of Wildfire at Urban Interface	Remove old abandoned buildings around towns	Fire	X	X	X	High	High	Low	High
Minimize Risk of Wildfire at Urban Interface	Institute weed control measures (mowing) around towns	Fire	X	X	X	High	High	Low	High
Enhance Emergency Response Systems	Provide awareness training on meth-labs	Technological	X			Low	Low	Low	Medium
Reduce Risk of Hazardous Material Incidents	Relocate anhydrous ammonia tank currently adjacent to town of Scobey	Technological	X			Low	Medium	Low	Medium
Reduce Risk of Hazardous Material Incidents	Secure fertilizer and propane plants to reduce unauthorized access	Technological	X		X	Low	Medium	Low	Medium
Reduce Risk of Biological Hazards	Investigate mitigation options for West Nile Virus	Technological	X	X	X	Low	Low	Low	Medium

POPULATION IMPACTED

High = > 50% of County residents

Medium = 20 to 50% of County residents

Low = < 20% County residents

PROPERTY IMPACTED & PROJECT COST

High = > $500,000

Medium = $100,000 to $500,000

Low = < $100,000

COST BENEFIT FORMULA

High = "5" for Population Impacted & Property Impacted; "1" for Cost

Medium = "3" for Population Impacted & Property Impacted; "3" for Cost

Low = "1" for Population Impacted & Property Impacted; "5" for Cost

COST/BENEFIT RANKING

High = 11 to 15

Medium = 6 to 10

Low = 0 to 5

TABLE 4-3

DANIELS COUNTY HIGH PRIORITY HAZARD MITIGATION PROJECTS

GOAL	***HAZARD MITIGATION PROJECTS***	***HAZARDS MITIGATED***	***COUNTY PRIORITY***	***COST/BENEFIT RANKING***
Minimize Risk of Wildfire at Urban Interface	Negotiate over haying CRP land that surrounds all towns in County	Fire	High	High
Minimize Risk of Wildfire at Urban Interface	Construct a fire break network around towns and for certain CRP locations	Fire	High	High
Enhance Emergency Response Systems	Install pigtails (electrical wiring) and 2-way switches at critical facilities to accommodate mobile generators	Fire, Flooding, Winter Storms, Tornadoes	High	High
Reduce Impacts from Flooding	Replace old bridges and culverts and improve roads to withstand flash floods	Flooding	High	Medium
Enhance Emergency Response Systems	* Obtain emergency generators to power sirens	Fire, Flooding, Winter Storms, Tornadoes	High	High
Enhance Early Warning Capabilities	* Obtain generator for radio station	Fire, Flooding, Winter Storms, Tornadoes	High	High

4.4 PROJECT IMPLEMENTATION AND LEGAL FRAMEWORK

Once the Daniels County PDM Plan is formally adopted, the County will use the cost-benefit analysis in the Plan to focus project prioritization. Mitigation projects will be considered for funding through federal and state grant programs, and when other funds are made available through the County. The LEPC, a consortium of local officials and disaster planning personnel, will be the coordinating agency for project implementation. The LEPC has the capacity to organize resources, prepare grant applications, and oversee project implementation, monitoring, and evaluation. Coordinating organizations may include local, county, or regional agencies that are capable of, or responsible for, implementing activities and programs. The DES Coordinator will be responsible for mitigation project administration.

A number of state and local regulations and policies form the legal framework available to implement Daniels County's hazard mitigation goals and projects. A list of these regulations and plans is presented below.

State of Montana

- Montana Subdivision and Platting Act
- Montana Building Codes
- Montana Sanitation in Subdivision

Local

- Comprehensive Growth Policy (under development)
- Daniels County Subdivision Regulations
- Septic Sewer permits

A summary of how the PDM Plan can be integrated into this legal framework is presented below.

- Use the PDM Plan to help the County's Comprehensive Growth Policy meet the goal of protecting public health and property from natural hazards.
- Initiate zoning ordinances in conjunction with flood mitigation projects to prevent development in flood-prone areas.
- Partner with other organizations and agencies with similar goals to promote building codes that are more disaster resistant on the State level.
- Develop incentives for local governments, citizens, and businesses to pursue hazard mitigation projects.
- Allocate county resources and assistance for mitigation projects.
- Partner with other organizations and agencies in northeast Montana to support hazard mitigation activities

5.0 PLAN MAINTENANCE PROCEDURES

The Plan maintenance section of this document details the formal process that will ensure that the Daniels County Pre-Disaster Mitigation Plan remains an active and relevant document. The Plan maintenance process includes a schedule for monitoring and evaluating the Plan and producing a Plan revision every five years. This section describes how the county will integrate public participation throughout the Plan maintenance process. Also included in this section is an explanation of how Daniels County government intends to incorporate the mitigation strategies outlined in this Plan into existing planning mechanisms.

5.1 MONITORING, EVALUATING AND UPDATING THE PLAN

The Daniels County Pre-Disaster Mitigation Plan will be reviewed every two years, or as deemed necessary by knowledge of new hazards, vulnerabilities, or other pertinent reasons. The review will determine whether a Plan update is needed prior to the required five year update. The Plan review will identify new mitigation projects and evaluate the effectiveness of mitigation priorities and existing programs.

The DES Coordinator will be responsible for scheduling a meeting of the Daniels County board of Commissioners (Board) to review and update the Plan. The meeting will be open to the public and advertised in the local newspaper to solicit public input. The Board, assisted by the Local Emergency Planning Committee (LEPC) and the public will review the goals and mitigation projects to determine their relevance to changing situations in the county, as well as changes in state or federal policy, and to ensure they are addressing current and expected conditions. The Board and public will also review the risk assessment portion of the Plan to determine if this information should be updated or modified, given any new available data. The list of critical facilities will also be reviewed and enhanced with additional details. The DES Coordinator will give a status report detailing the success of various mitigation projects, difficulties encountered, success of coordination efforts, and which strategies should be revised. The status report will be published in the local newspaper to update local citizens.

The DES Coordinator will be responsible for the five year Plan update of the Plan, and will have six months to make appropriate changes to the Plan before submitting it to the Board and public for review and approval. Before the end of the five-year period, the updated Plan will be submitted to the State Hazard Mitigation Officer and the FEMA for acceptance. The DES Coordinator will notify all holders of the county Plan when changes have been made.

5.2 IMPLEMENTATION THROUGH EXISTING PROGRAMS

Daniels County is currently developing a Comprehensive Growth Policy to address statewide planning goals and legislative requirements. The Pre-Disaster Mitigation Plan provides a series of projects – many of which will be closely related to the goals and objectives of the County Growth Policy. Daniels County will have the opportunity to implement hazard mitigation projects through existing programs and procedures. Local officials will work with the County departments to ensure hazard mitigation projects are consistent with planning goals and integrate them, where appropriate.

The County Building Department is responsible for administering the building codes in local municipalities. After the adoption of the mitigation plan, they will work with the State Building Code Office to make sure that the County adopts, and is enforcing, the minimum standards established in the State Building Codes. In addition, the County Building Department will work with other agencies at the state level to review, develop and ensure building codes that are adequate to mitigate or prevent damage by natural hazards. This is to ensure that life-safety criteria are met for new construction.

Within six months of formal adoption of the PDM plan, mitigation goals will be incorporated into the County Comprehensive Growth Policy. Meetings of the Board will provide an opportunity for local officials to report back on the progress made on the integration of mitigation planning elements into county planning documents and procedures.

5.3 CONTINUED PUBLIC INVOLVEMENT

Daniels County is dedicated to involving the public directly in review and updates of the Pre-Disaster Mitigation Plan. The public will have many opportunities to provide feedback about the Plan. Copies of the Plan will be catalogued and kept at all appropriate agencies in the County as well as at the Public Library. The existence and location of these copies will be publicized in the County newspaper. Section 2.0 of the Plan includes the address and the phone number of the DES Coordinator responsible for keeping track of public comments on the Plan.

A series of public meetings will also be held prior to each two year review and five year update, or at lesser intervals when deemed necessary by the Board. The meetings will provide the public a forum for which they can express its concerns, opinions, or ideas about the Plan. The DES Coordinator will be responsible for using county resources to publicize the annual public meetings and maintain public involvement through the newspapers and radio.

6.0 REFERENCES

CH2H Hill. 1980. Box Elder Creek Dam, Plentywood Montana, Sheridan County. Phase I Inspection Report national Dam Safety Program.

Department of Interior (DOI), Bureau of Reclamation, Montana Department of Natural Resources and Conservation. 2002. Draft Programmatic Environmental Assessment, Fort Peck Reservation Rural Water System Fort Peck Reservation and Dry Prairie Service Areas.

DES, 2001. State of Montana Natural Hazards Mitigation Plan. Prepared by Division of Disaster and Emergency Services and Montana's Hazard Mitigation Team, October, 2001.

FEMA, 1997. Multi Hazard Identification and Risk Assessment. A corner stone of the National Mitigation Strategy. Federal Emergency Management Agency.

Montana Department of Labor and Industry. 2001. Annual Average Labor Force Summary Report.

Montana Magazine of Western History, 1985. *Montana Episodes – Controlling Mormon Crickets in Montana*. *1936-1941*. Volume 35, Number 1, Winter 1985.

National Weather Service (NWS). Newspaper Article Collection of Historic Weather Events. Glasgow, Montana.

Omang, R.J. 1990. Water-Surface Profile and Flood Boundaries for the Computed 100-Year Flood, Poplar River, Fort Peck Indian Reservation. U.S. Geological Survey, Water-Resources Investigations Report 90-4169.

NWS. Top Weather Events. Compiled by Gene Petrescu, NWS, Missoula, Montana.

NWS, 2000. Halloween 1999 Firestorms. National Weather Service Power Point Presentation.

U.S. Bureau of the Census. 2001. Profile of General Demographic Characteristics for 2000.

U.S. Bureau of the Census, 2001b. Table A98-30 (Estimated Number and Percent People of All Ages in Poverty by County: Montana).